HE CHEMICAL AGE

OL LVII 29 NOVEMBER 1947 No 1481


1947

INDEX TO ADVERTISERS
IN THIS ISSUE

FULLY OPEN TOP DRUMS

READS' E.H. PATTERN HOOP CLOSURE DRUM

is possibly the simplest effective method of closing and sealing fully Open-top Containers for the transport of Pastes, Powders and certain Liquids. When manufactured from Tinplate and/or internally lacquered it is also suitable for foodstuffs. Rubber or Cotton Rings are used as the gasket and, when necessary, these Drums can be supplied air or liquid-tight.

Available from 7″ to 22″ diameters and up to 42″ in depth. Materials include Mild Steel, Tinplate, Terneplate, Tin-Terne Plate, Aluminium and other non-ferrous materials. 28 BG to 18 BG thicknesses.

In all but the four largest sizes, these Drums can be supplied fully lithographed or printed to specification. The interiors of all sizes can be supplied lacquered, enamelled, or finished with suitable coatings for the appropriate product, or, alternatively, the exteriors and/or interiors can be supplied painted to requirements.

READS

OF LIVERPOOL

MANUFACTURERS OF PLAIN OR PRINTED TINS, CANS, KEGS AND DRUMS

READS LIMITED · ORRELL HOUSE · ORRELL LANE · WALTON · LIVERPOOL 9 · AINTREE 3600
227 GRAND BUILDINGS · TRAFALGAR SQUARE · LONDON · W.C.2 · WHI 5781
ALSO AT LONDON, GLASGOW, BELFAST AND CORK

R3051/I-C1

The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

BOUVERIE HOUSE, 154 FLEET STREET, LONDON, E.C.4

Telegrams: ALLANGAS FLEET LONDON Telephone: CENTRAL 3212 (16 lines)

SCOTTISH OFFICE: 116 Hope Street, Glasgow (Central 3970)

MIDLANDS OFFICE: Daimler House, Paradise Street, Birmingham (Midland 0784-5)

THE CHEMICAL AGE offices are closed on Saturdays in accordance with the adoption of the five-day week by Benn Brothers Limited

VOL. LVII No. 1481. 29 November 1947 Annual Subscription, 26s. 8d. per copy; post free, 10d.

Science and Government

SIR EDWARD APPLETON, 1947 Nobel prizewinner, whose scientific achievements have been associated primarily with the highly rarified region of the ionosphere —" the Appleton layer " which he himself called the "F layer"—was brought to earth in 1939 to become head of the D.S.I.R. under the title of secretary. The result of over eight years' work in that arduous post, covering the most active years of organised research known in this country, has been the formulation of views of the nature of organised and individual research that must command the highest attention from all concerned. These views were given permanent form and substance when he delivered the first Arthur Dehon Little Memorial Lecture a year ago at the Massachusetts Institute of Technology. The publication of this lecture in book form provides an opportunity to review the opinions formed by Sir Edward during his tenure of a post which is in effect that of Research Director to the British Empire.

Scientific workers of the 19th century placed disproportionate emphasis on " the pursuit of science with dignity." Theirs was a high calling, and in it there was no room for purely financial considerations. Trade was beneath the dignity of the aristocracy; no true scientist would "prostitute" his calling by applying his knowledge for the benefit of industry.

That spirit lingered on well after the first world war; Sir Edward, still a relatively young man, remembers hearing a British scientist boast that he could claim that what he had done could never be of the slightest use to anybody—a claim which later events confuted—though through no fault of his own.

The attitude to the functions of science was a purely Victorian conception. Sir Edward reminds us that, in his " New Atlantis," Sir Francis Bacon, contemporary of Queen Elizabeth and James I, described a plan for what was in effect a National Research Laboratory. Describing the staff of that laboratory, he wrote: " We have three that try new experiments such as themselves think good. These we call pioneers. We have three that bend themselves, looking into the experiments of their fellows and cast about how to draw out of them things of use and practice for man's life and knowledge. These we call Benefactors. Lastly, we have three that raise the former discoveries by experiments into greater observations, axioms and aphorisms. These we call Interpreters."

There we have the whole picture—the fundamental research workers; the pilot plant boys who try to put the discoveries of pure science to practical effect; the industrialists who bring discoveries of the first two into commercial application for the good of all. Sir Edward Appleton has clearly taken Bacon's conception as his own guiding principle, bringing it into line with modern requirements.

It matters not at all that the pure scientists may take no interest in the practical application of their work; that is the function of the Benefactors and the Interpreters. Pure research is predominantly the concern of the universities and, as Sir Edward notes, although carried out in a spirit of pure inquiry this free, fundamental research has shown an astonishing capacity for being useful.

The increasingly close association between Government, particularly one

On Other Pages

with the philosophy of the present Government, and research may have on scientific development a bearing too fundamental to be ignored. What should be the organisation of research? All organisation—or freedom for the individual to develop his peculiar gift? In the commercial field, the Government evidently can see no merit save in regimentation. The nationalised industries preserve a departmental privacy without enterprise and elsewhere controls and bulk buying tend to produce the same result.

Sir Edward and, we may conclude, the D.S.I.R., have room for the individualist and are prepared to give him his head with full support. "We must never forget the outstanding importance of the exceptional man. Most of the really great advances in science have been accomplished by small teams of workers led by a man with ideas. As one concerned, to some extent, with the organisation and support of science in Britain, I believe that a vital task is to see that these leaders, these men with ideas and inspiration, lack neither disciples, assistants, nor equipment. When such needs have been satisfied they should be left alone." Sir Edward said that and we are thankful for the reassurance. Industrialists all over the country will pray that Sir Edward may bite each member of the Government to infect them, severally and collectively with the germ of this idea.

It took a world war to convince politicians that they needed the help of scientists. To-day, while scientists are still regarded in the Civil Service as lesser fowl they have been accorded right of entry. Scientific and technical experts of many branches are firmly established as advisers to Government departments. There are Government laboratories in which experimental work required by the several Ministries can be done, and to which the Ministries can turn for advice. The change has shaken the older Civil Service to its foundations.

The Civil Service, however, is still ruled by old customs. How then can it be ensured that the work of the scientific departments shall be effective in the executive departments? Sir Edward's solution is on the same lines as that put forward for industry a few years ago by Sir Harold Hartley in his report to the F.B.I. It is the appointment of a Scientific Adviser in each department. But, evidently knowing the habits of the Civil Service, Sir Edward emphasises that "for such a scientific adviser to be effective it is necessary that he should be sufficiently senior in the Department hierarchy. His advice should be tendered to the highest level—the level at which policy is decided."

As a pointer to the lines on which future "official" research may develop it is worthy of note that its principal director is opposed to the division of research into "pure" and "applied." There is to his mind a certain suggestion of snobbishness about this division. He would prefer to divide it into three new classes: (a) free fundamental, the extension of the frontiers of knowledge; (b) objective fundamental, research designed to give insight and understanding rather than any immediate practical result, but relevant to some field of practical importance; and (c) applied research. Industrial laboratories may find it necessary to undertake all three types of research, though generally they will concentrate on the two last-named.

NOTES AND COMMENTS

British Oil Developments

RECENT development projects in chemical and allied industries have been relatively so abundant and on so large a scale that reaction to the announcement of the giant scheme by which the petroleum companies plan to build up the U.K. oil refining capacity is less lively than the speculation such an event would have aroused even a few months ago. The implications of the building scheme to cost substantially more han £100 million with which the Shell, Anglo-Iranian, Royal Dutch and other companies are concerned are, however, revolutionary enough from the viewpoint of industrial shape of things to come. The principal objective, making this country self-supplying and a supplier of petroleum products, of which all the world, not excluding the U.S.A., stands in need, is alone capable of profoundly relieving our economic troubles. The results which may conceivably be produced in chemical industry could be even more fundamental now that the potentialities of petroleum as a source from which flows a host of basic chemicals, solvents and plastics are fully recognised. The liberation of energy in chemical industry which so abundant and versatile a contribution to raw material supplies could produce might alone repay the vast capital expenditure in the course of a few years. Such considerations, however, are at the moment purely speculative. Of more practical significance is the knowledge that five years are likely to elapse before the scheme comes to fruition. Meanwhile, the tacit approval of the Government and its assurance of the necessary supplies of steel may be assumed and news of recent developments in the oilfields in the Near and Middle East, including extension of the pipelines, indicate that the project of which these refineries will be the culminating point has been well planned.

American Exposition

AMERICA'S 21st Exposition of Chemical Industries opening on Monday next in the Grand Central Palace, New York, seems destined to open at least some new horizons in chemical industry. The keys to current developments, now in many cases being shown for the first time, are of many kinds, but perhaps the most fruitful have been the fresh uses of familiar constructional materials and the provision of new ones with powers of endurance unequalled in chemical engineering history. Even more productive of results of direct value to industry will be the further surge in the rising tide of applications of plastics and synthetic resins which has reached greatly higher levels during and since the war. Typical examples are the water dispersion of synthetic resin replacing the customary drying oils in paints, which is said to be odourless, to dry in less than half an hour and to provide finish and durability of a high order, and a polyvinyl acetate copolymer emulsion providing a ready-to-use cold glue. These are characteristic of the more practical uses of recent chemical progress; of even wider interest in this country will be the fundamental advances in instrument technology, in which the New York Exposition may be expected to provide fresh impetus here in the extension of automatic controls and continuous processing.

Wagon Crisis

THE incompatibility of the five-day week in industry and the need to run all industrial equipment at its maximum capacity is proclaimed once more by Sir Stafford Cripps's recent warning of the urgency of rapid handling of railway wagons—which, like coal, are capable of bringing all the heavy industries rapidly to a state of partial paralysis. One reassuring fact that the current shortage of rolling stock has served to underline is that the railways, living as they do in the devitalising shadow of the Transport Ministry, still preserve a directness and vitality which enable them to deal with an emergency, of which the present dearth of freight wagons is certainly one, with refreshing directness. The spirit born in the blitz is not wholly defunct. The specific evidence of this comes from the L.M.S.R., whose service representative was at some trouble this week to ensure that THE CHEMICAL AGE was fully acquainted with the background to the present wagon shortage and with present and future plans to accelerate the turn-round. Briefly, the situation demands that all wagons must be "returned empties" within 48 hours of acceptance at their loaded destinations and, because failure may have disastrous results

for industry, the present demurrage charges of 6s. per day after 48 hours are to be "drastically increased—and rigorously enforced" wherever failure to comply is not unavoidable.

Footing the Bill

THE fact that a wagon makes a convenient addition to a factory's storage space is apparently one of the factors which have helped to produce the present situation. Hereafter, the charge of perhaps one or two guineas a day rental will induce a more public spirited policy among the "black sheep." For others the necessity of clearing all wagons within two or three days at the longest represents another form of indirect taxation. Some firms—I.C.I. were mentioned—are already paying overtime to secure that their wagons are cleared at week-ends. By Government sanction week-ends are national leisure period; Government edict demands—reasonably enough—that railway wagons must not stand laden from Friday to Monday. Industry is privileged to rationalise the paradox—and pay the bill.

World Library of Chemistry

AFTER a temporary suspension a well known tool of research and documentation is resuming publication in Berlin, under the editorship of Eugen Klever, who discusses some of his methods and policy in *Chim. et. Ind.*, 1947 (9), *58*, 290-3, together with some suggestions for an international documentation service. It is claimed for the *Chemisches Zentral-blatt* that its service before the war was unique in the promptness with which its abstracts were issued, the vast and varied field surveyed, and especially in the analytical tables which formed a prominent and invaluable feature of the publication. In 1937 no less than 71,062 abstracts were prepared and published from 3000 periodicals, utilising the services of 400 qualified chemists. The analytical table contained 175,000 references and the formulæ index gave information about 36,000 organic compounds. Although the present organisation, number of journals available and so on, cannot hope quickly to reach the pre-war level, every attempt will be made to build up to and surpass that level in due course; a large number of chemists are available as collaborators or abstractors.

International Exchange

IN a larger international scheme the Editor suggests that, pending such a consummation, it should be possible to arrange interchange of journals and abstracting services between countries. The essential conditions for such a service would include (1) publication within the shortest possible time of abstracts edited by experts from world-wide sources; (2) a continual index as basis for up-to-date information on any subject; (3) availability of all originals in a central library whence photo-copies of micro-films could be promptly supplied; (4) complete annual index and analytical table. To implement the ideas a Centre International de Documentation (C.I.D.) will have to be organised, publishing results of its work in three languages—English, French, German. Close collaboration between similar documentary bodies in individual countries will be necessary and in the very important matter of indexing it is suggested that the liaison offices in other countries—the various local editorial centres—should, in sending in their abstract contributions, include a note as to indexing. The abstracts themselves would all be of uniform pattern. The central library should be entitled by UNO or UNESCO to receive copies of all periodicals and books relevant to the fields of research to be covered. No doubt can exist about the desirability of recreating quickly on the widest scale this international source of chemical information, or of its title to widespread support in the interest of world relationships, as well as of science.

Monsanto's New Laboratories

NEW research laboratories which Monsanto Chemicals, Ltd., are building at their Cefn Mawr factory will cost more than £100,000, and will provide most up-to-date research facilities as part of the £2,000,000 development scheme announced earlier this year. The latter includes a new factory at Newport (Mon.). The buildings have been described by Dr. W. D. Scott, chief chemist, as strictly functional in design, but pleasing in appearance, both internally and externally. They will contain fourteen separate laboratories and provide accommodation for seventy scientists and technicians. Care and attention have been given to the design of the physical laboratories as well as the well-equipped workshop and library. The whole will represent one of the most up-todate industrial research units in the kingdom.

BIG BRITISH PETROLEUM SCHEMES

Britain to have Two New Oil Refineries

IMPORTANT influences upon British petroleum and chemical industries are likely to result from the proposals just made by the Royal Dutch-Shell group for the financing of its development programme during the next two years, the significance of which is discussed elsewhere in this issue. The group, which had an output last year of 32,702,000 metric tons (eual to about 8.5 per cent of world production), as compared with 29,924,000 metric tons in 1938, has budgeted for capital expenditure of £105,000 million, a phenomenal figure even when allowance is made for the present high cost of plant, equipment and labour. The bulk of this sum, *i.e.*, 41 per cent, will be spent on refineries and chemical plants (excluding that of the U.S. Shell Union), followed by expenditure on oil production and exploration, absorbing 34 per cent.

Other development plans of special significance include the extension of research and chemical plants. It is well-known that a plant for synthetic soap has been built in Britain, and another is being erected in Holland. There can be little doubt that the overall expansion of the group's activities and the great attention devoted to refining in particular, will give a corresponding stimulus to the increasing activities in the chemical field.

Allocation of Capital

Marketing installations, which have been disorganised by the war and which also need much more expansion in view of the ever increasing world demand for oil products, account for 16 per cent, while 9 per cent will be spent on tanker construction.

Because of the well-known 60 : 40 division between the Royal Dutch and the Shell. the latter will find some £42,000,000 by the end of 1949, with £28,100,000 to be derived from the proceeds of an issue of 9,648,544 ordinary shares of £1 each.

Of the three main operating companies of the group, the Anglo-Saxon Petroleum Co., which has producing interests in various parts of the world, and which runs refineries and carries out oil research in the Empire, will spend £70 million; the N.V. de Bataafsche Petroleum Mij., owning producing and refining interests in Holland, the Netherlands East and West Indies, etc., will find about £25 million, while the marketing company, Shell Petroleum Co., will spend some £10 million.

Chiefly as a result of the expected increase in the production of the fields in Kuwait, Arabia, an expansion of the group's refinery capacity became imperative. By the end of 1949, refining capacity will total 36,750,000 tons per annum, as compared with the present figure of 29,750,000 tons per annum.

British and Foreign Refineries

In this country, two complete refineries are to be erected, one on the Thames, the other on the Manchester Ship Canal, where the Shell Chemical Manufacturing Co. is already constructing a plant for the manufacture of chemicals from oil. Furthermore, the Pernis refinery, Rotterdam, is to be extended and a reconstruction and extension of the refineries in the Netherlands East Indies and in British Borneo are to take place. The refining facilities in Venezuela are to be increased to handle the growing output of that country—which occupies the second position in the list of world producers—and last, but not least, the Haifa refinery, in which the group has a 50 per cent interest, is to be expanded to deal with the additional crude which will reach the coast of the Eastern Mediteranean from the new pipelines at present under construction by the Iraq Petroleum Co. When completed, these pipelines will treble the present rate of delivery of Iraq crude oil.

The group's circular reports that considerable progress had already been made in repairing and restoring facilities in war-ravaged areas. Output in British Borneo aggregates nearly 7000 tons a day, while in the Netherlands East Indies, where the group could not yet regain all major fields, output runs at some 3600 tons a day.

7000 TONS OF ENGLISH OIL

DURING the past seven years, 7000 tons, or 2,000,000 gallons, of oil have been pumped from small reservoirs below ground in the fields around the main bore hole at Formby (Lancs.) by the D'Arcy Exploration Co., a branch of the Anglo-Iranian Oil Co. It is stated that there may be important developments if exploratory boring with a new type of drill, whose tip is already two miles below the surface, is successful. Main resources may be below an unusually hard layer of rock. Portable equipment, consisting of a derrick and two mobile pumps, is being sent from Eaking (Notts) oilfields for this work. The holes will vary in depth from 100 to 1500 feet. Apart from the quest for oil in the deep shaft, company technicians have planned to make twelve new borings. The only other oil-producing area in this country is in Nottinghamshire, giving a total output in Britain of about 300 to 400 tons a day.

LARGE-SCALE WATER PURIFICATION

A PILOT plant is now being erected in the grounds of the Weizmann Institute of Science at Rehovot in southern Palestine; its purpose is the desalting of brackish waters in order to render them suitable for domestic and industrial uses. The water problem in Palestine is of the greatest importance for the effective colonisation of the country and the utilisation of saline groundwater found in many parts of the country, including the southern sandy waste known as the Negev, would open up new prospects of development.

The process is based on a discovery made public in 1935 by two English scientists, B. A. Adams and E. L. Holmes, who developed the use of synthetic resinous materials—ion-exchange materials—for the desalting of water. Instead of expensive distillation methods used hitherto, this process involves the percolation of saline waters through successive beds containing resinous ion-exchange material in granular form. In more recent years improved materials have been developed and the method is now used to purify waters in industry, primarily boiler-feed waters. However, the method as at present utilised in industry is far too uneconomic for large-scale use, such as irrigation.

Dr. Walter Juda, lecturer in chemistry at Harvard University, first thought of working out this process in a simplified form, adapting it to the special needs of Palestine. In 1945 an organisation, known as the Palestine Research Association, was formed at Cambridge, Mass., to make donations to Harvard University to support experimental research in the Harvard chemical laboratories on the problem of desalting water. The work was carried on by Mr. Morris Carron, under the direction of the late Prof. Jones and Dr. Juda, and sufficiently encouraging results were obtained to warrant the erection of the Rehovot pilot plant, which Dr. Juda and Mr. Carron are now supervising. The plant will demineralise water containing from 1000 to 2000 per million parts of dissolved salts (the ground water of the Negev falls into this category), bringing the salinity down to about 400-500 parts, which is sufficiently low for drinking purposes. Two thousand gals. of water can be treated daily.

It is also planned to investigate the recovery of water from the plant's waste waters by means of solar stills, as designed by Dr. Benjamin Siegel, who will join the Weizmann Institute of Science next year to do research work with the electron microscope. By using a combination of desalting solar evaporation processes the work now carried out at the Weizmann Institute will reduce waste and increase the yield of good quality water. In connection with the enlarging of the Institute at Rehovot a new housing scheme to accommodate scientists and technical staff has now been started.

One method of stepping up industrialisation will be in the extension of the country's chemical industry making use of oil by products and of the by-products of the Dead Sea Potash Works. Oil is still being sought in the south of the country, where drillers have already discovered fresh water. A second boring will shortly begin about 60 miles inland from the Mediterranean, while ravimetric and seismic tests are still being carried out in the region of the Dead Sea.

Expanding Use of Furfural

Discussing the development of furfural, a vital raw material of the petroleum, paint, rubber and other industries, Dr. L. B. Hitchcock and H. R. Duffey, of the Quaker Oats Company, told the American Institute of Chemical Engineers that the disposal of oat hulls was formerly a serious problem, but by 1943, the entire supply was used in furfural manufacturing, and corn cobs had to be used to augment the raw material supply. This chemical has made possible developments in other industries which have assisted materially in the growth of the chemical industry. The future for the industry appears bright as further uses and products of furfural are multiplying. From the 16 million tons of corn cobs annually available in the United States, three billion lb. of furfural could be produced.

Iron Powder Cores

Although German methods for manufacturing iron powder cores are generally similar to American methods, according to a report by the U.S. Office of Technical Services, better results are apparently obtained by the former. It is concluded that the carbonyl iron powders used in Germany are of better quality than American powders. Mixing and insulating materials, although containing the same components, are different inasmuch as the mixing is of longer duration and is done in a liquid medium. The general method is pre-insulation followed by drying the powder, then the main insulation; drying, pressing and ageing then ensue. Special attention is also drawn to the low carbon (0.1 per cent) and low nitrogen (.01 to .02 per cent) contents specified for some of the German powders.

U.K. TRADE IN OCTOBER

Marked increase in Chemical Exports

UNITED Kingdom exports in October were the second highest in value of the monthly totals since the war. The grand total for the month of £108.2 million represents an increase of £9.2 million since September, itself the second highest total since the year began, and is surpassed only by July's phenomental return of £110.3 million.

Total imports at £161.428 million show proportionately much smaller increase—£720,000—continuing the tendency evident since August last, when total imports were worth £174.039 million.

Chemicals, drugs, dyes and colours just failed to maintain the high level of exports reached a year ago, the October total of £6.210 million representing a reduction of some £346,000. Imports under this head showed proportionately a steep increase to £3.364 million, against the £1.499 in October a year ago.

Exports of non-ferrous metals and manufactures increased by more than £405,000 to £4.090 million and imports in the same category more than doubled their value, contrasted with the corresponding total a year ago, £9.212 million.

Among the noteworthy changes in exports for the month of chemical and associated products was another very large increase in fuel and creosote oils, to 2295 million gallons compared with 138,330 a year ago, and substantial reductions in sales of most sodium compounds. Sharpest reductions were: sodium carbonate, 162,717 cwt. (1946, 458,278), caustic soda 165,272 cwt. (1946, 210,310), chromate and bichromate 6 cwt. (1946, 1738). Sales of calcium carbide slumped to 1461 cwt (1946, 30,108) and there were many reductions on a smaller scale in other categories.

A summary of the principal totals is as follows:—

CHEMICAL EXPORTS

	Oct., 1947	Oct., 1946
	Cwt.	Cwt.
Citric acid	992	1,393
Formic acid	1,785	4,178
Tartaric acid	402	200
	Tons	Tons
Aluminium oxide	107	1,676
Sulphate of alumina	2,976	2,937
Sulphate of ammonia	19,891	21,526
Nitrate of ammonia	12,524	12,760
	Cwt.	Cwt.
Bleaching powder	42,192	66,887
Calcium carbide	1,461	30,108
	Gal.	Gal.
Benzol	6,794	95,824
Cresylic acid	198,283	232,663
Tar oil, creosote, anthracene oil, etc.	2,295,981	138,330
Naphthalene	1,188	1,811
Nitrocellulose	2,238	2,490
Disinfectants, insecticides, weed killers, etc.	69,903	94,695
	Tons	Tons
Copper sulphate	1,900	3,629
	Cwt.	Cwt.
Glycerine	258	281
Nickel salts	11,141	7,744
Lead acetate, litharge, red lead, etc.	7,304	5,932
	Tons	Tons
Magnesium compounds	731	620
	Cwt.	Cwt.
Potassium compounds	7,414	7,507
Sodium carbonate	162,717	458,278
Caustic soda	165,272	210,310
Chromate and bichromate	6	1,738
Synthetic nitrate	—	2,320
Sodium silicate	10,518	24,673
Sodium sulphate	3,431	43,758
	Tons	Tons
Salt	15,049	15,968
Total value of chemical manufactures, excluding drugs and dyestuffs	£3,474,432	£3,413,640
	oz.	oz.
Quinine and quinine salts	116,658	155,371
	Mega units	Mega units
Penicillin	210,597	—
	lb.	lb.
Acetylsalicylic acid	49,478	163,545
Total value of drugs, medicines and preparations	£1,295,477	£1,663,348
Total value of dyes and dyestuffs	600,158	758,918

CHEMICAL IMPORTS

	Oct., 1947	Oct., 1946
	Cwt.	Cwt.
Acetic acid	13,364	9,604
Boric acid	—	690
Tartaric acid	—	2,280
Borax	2,940	6,000
Bromine and bromides	1,769	—
Calcium carbide	9,645	1,473
Coal tar products, excluding benzole and cresylic acid	4,996	1,426
	Tons	Tons
Phosphate	—	2,973
Manufactured fertilisers	4,654	24,918
	Cwt.	Cwt.
Potassium chloride	455,079	297,224
Potassium nitrate	—	692
Potassium sulphate	31,000	820
Sodium nitrate	29,910	—
Carbon blacks	63,393	70,979
Total value of chemicals, drugs, dyes and colours	£3,364,532	£1,499,689

Key Industry Duty Exemption.—The Treasury has made an order exempting chlornitrobenzol, ortho, and pentachlorphenol from Key Industry Duty, from November 15 to December 31. The Order is entitled "The Safeguarding of Industries (Exemption) (No. 8) Order 1947" (H.M.S.O., 1d.).

American Chemical Notebook

From Our New York Correspondent

CONTRARY to the general upward trend of prices during the past year, reductions have just been announced by two U.S. companies for important products used by the chemical industry. The Stauffer Chemical Company reduced the price of insoluble sulphur (85 per cent insoluble in carbon bisulphide) by five cents a lb. while the Bakelite Corporation reduced the price of polyethylene from 4 to 7 cents per lb. for the various grades. The Stauffer Chemical Company's price reduction is attributed to a new process of manufacture supplanting the process which has been employed since 1934. The main use for insoluble sulphur has been by the rubber industry in tyre carcass stocks, repair stocks, and in some types of mechanical rubber goods. Further price reductions for the chemical are expected to result when increased sales and further production economies are effected. The reduction of Bakelite's polyethylene is the second reduction in less than six months and the fourth since mid-1942, bringing down the price of the plastic material more than 60 per cent.

* * *

Financial statements just made public by the various chemical companies show increased profits and greater turnovers, as indicated below. All figures cover the nine-month period ended September 30. American Cyanamid Co., net income of $6,294,571 which compares with $6,191,005 for the same period last year. Net sales amounted to $155,099,434 as compared with $130,127,684 last year. Net profits of the Monsanto Chemical Company were almost double those of the first nine months of 1946 being $12,395,367 compared with $6,987,663 in 1946. British and Australian subsidiaries are, of course, excluded. Earnings do not include any recovery of profits under use and occupancy insurance as a result of the destruction of the Texas City plants last April. Reconstruction is said to be proceeding satisfactorily. General Electric Company's net income for the 1947 period was $56,459,434, compared with $404,109 for 1946, when the company's principal plants were closed for nine weeks by a strike. Net sales totalled $820,957,807 against $421,439,436. E. I. du Pont de Nemours and Co. has reported net earnings of $83,220,901, which compares with the 1946 figure of $82,179,876. Net earnings for other companies during the nine-month (unless otherwise stated) periods of 1947 and 1946 respectively were: Texas Gulf Sulphur Co. (quarter ended September 30) $5,483,870 and $4,249,886; Hercules Powder Co.—$10,057,668 and $5,631,636, sales being $98,969,694 and $72,453,609; Westvaco Chlorine Products Corporation—$1,954,214 and $737,060; Victor Chemical Works—$1,679,634 and $1,612,974; Sun Chemical Corporation—$996,670 and $925,785; Consolidated Chemical Industries, Inc.—$2,535,539 and $1,532,160; Interchemical Corporation—$2,320,159 and $1,239,546; Mathieson Alkali Works, Inc.—$2,076,646 and $1,431,803; United States Industrial Chemicals, Inc.—(six-month period ending September 30) $1,216,708 and $1,229,208, a slight decline.

* * *

Martin Bernhardt, general manager, has announced that the Chem-Tech. Products Corporation, 62 William Street, New York City, N.Y., has been formed to specialise in supplying foreign countries with chemicals and technical equipment and apparatus for laboratory development and pilot plant work and the sale of fine chemicals and pharmaceuticals.

* * *

A new technical booklet which for the first time includes a description of the properties and uses of all synthetic resins produced by the Hercules Powder Company, Wilmington, Delaware, was issued last week. The company's synthetic resins, most of which are rosin-base, have found application in a wide number of industries including protective coatings, adhesives, printing inks, paper and textile sizes, and essential oils and fixatives. Brief descriptions of the following groups of resins are included: Methyl esters of rosin; the cellolyns, first group of synthetic resins designed primarily for cellulose lacquers; ester gums; flexalyn resins, glycol esters of rosin; the lewisols, a series of rosin maleates; the pentalyn series of pentaerythritol resins; petrex resins; poly pale esters; and staybelite esters.

* * *

Earl W. Glen, chief of the Rubber Division, Office of Materials Distribution, U.S. Department of Commerce, in answer to rumours that allocations of general purpose synthetic rubber (GRS) were about to be re-imposed in the United States, has announced that sufficient supplies of GRS are available to make it unnecessary. Quarterly requirements have been diminishing, following revisions of R 1, the rubber order. Specification changes in the September amendment to the order will reduce still further the proportionate requirements for GRS, Mr. Glen stated, due to elimination of mandatory use of that type of rubber in non-transportation products. Flexibility in the operation of U.S. GRS plant facilities remaining active, permits sufficient expansion of production to take care of the high level of tyre manufacture.

U.S. CHEMICAL EXPOSITION

Review of Progress in New York Next Week

THE 350 exhibits comprising the 21st Exposition of Chemical Industries which will open in New York on Monday next, for six days, will present abundant evidence of the great advances made recently in all phases of the chemical and allied industries. The display—writes our New York Correspondent—will provide pointers to the sources of the recent great expansion of the major chemical industries. Chemical processing equipment has been newly developed or redesigned to utilise the latest advances in structural materials, permitting operations to be conducted far beyond former concepts of what such plants can endure.

Among the exhibits will be a group of chlorinated products, now coming out of a new 85-acre plant in West Virginia, including specialised emulsifiers for the food, cosmetics, insecticide and other industries, plasticisers for a wide range of materials and synthetic waxes. One of these has a high melting point and is offered as a lubricant in wire-drawing and also as an anti-blocking agents for plastics and rubber.

Photographs at one of the booths will reveal details of the first full-scale continuous solvent-extraction plant ever built for processing cottonseed. This is the first of three solvent extraction plants to be built along the Mississippi River in Arkansas, following an extensive pilot plant development.

550 New Chemicals

Many chemical agents are of such wide application that merely to depict their uses constitutes an effective display suggestive of still further applications. One such display will be devoted to reaction equations and flow-sheets for a great variety of industrial applications of liquid sulphur dioxide and liquid methyl chloride. In another exhibit there will be 550 samples of " new chemicals for industry " developed since the last exposition.

Versatility is an outstanding characteristic of most of the processing equipment to be displayed. Retorts, tanks, towers, grinding and pulverising equipment, as well as pumps, screens and separators, heat exchangers are well represented. Because of its dimensions and the great number of items displayed, such equipment occupies a large proportion of the exhibition space.

Other displays will reveal many advances in the processing and application of stainless steel and other highly resistant alloys, some of which have been radically improved. Several displays will demonstrate the special uses of non-ferrous metals in the chemical industries. For processors handling strong acids there will be an exhibit of lead lined products and equipment, including lead covered copper tubing, wherein marked cost reductions are offered through the adoption of improved manufacturing techniques.

Perhaps the most rapidly expanding group of materials is the plastics and synthetic resins, of which several entirely new applications will be shown. Ionic exchange synthetic resins for the removal of cations and anions from industrial waters will be offered in one of the more extensive displays of filtering equipment.

Special Purpose Plant

Equipment designed to fulfil special purposes continues to multiply and many examples will be on view. Pumps capable of producing very high vacuums are a vital part of the processes for producing penicillin, blood plasma, metal evaporation, lens coating, metal sintering and all sorts of drying and distilling operations. A new product that will be put on display is an automatic fraction collector for chromatographic work, which automatically collects and counts drops of fluid, depositing specified amounts in test tubes. These machines accommodate up to 200 test tubes.

Exhibited for the first time will be a fast-acting dissolver and disperser, said to be up to 20 times faster than conventional equipment. Its effectiveness is ascribed to a special impeller design which sets up shear between interfaces with a high velocity gradient, and circulates the entire contents of the tank through a high velocity area.

Instruments

Added to the fast-growing list of instruments which utilise the latest scientific developments will be a Geiger-counter fluorescence analysis unit and a portable radiation detector. There will also be an explosion-proof *p*H meter for industrial control, and another similar instrument which operates from the plant power line without use of batteries.

Other completely new instruments to be put on display at the show will include the infra-red gas analyser originally developed for atomic research; a micromanometer measuring water pressures in increments of 0.001 inch of water; an industrial cartesian manostat constructed to maintain constant pressure or vacuum to within one-tenth of one per cent; and a reversible humidity indicator for incorporation in optical instruments which gives warning of humidity in excess of any predetermined level and reverts to non-indication when humidity drops below the danger point.

IRON COMPOUNDS AND PHOSPHATIC FERTILISERS—III

STUDY OF CHANGES DURING STORAGE

by H. W. LEHRECKE, Ph.D.

THE earlier conclusion—that only amorphous $FePO_4$ and $H_3[Fe(PO_4)_2]2.5H_2O$ are readily soluble and that the crystalline forms of $FePO_4$ are insoluble for fertiliser purposes—was confirmed by investigating composition of the crystalline phases in equilibrium with the liquid phase of iron-rich superphosphate.

The superphosphate in question was made from Swedish apatite with a content of 7-8.5 per cent Fe, present in the form of haematite (Fe_2O_3) and magnetite (Fe_3O_4). In order to get a superphosphate with a high degree of water- and citrate-soluble P_2O_5 it was necessary to use a (10-15 per cent) larger quantity of sulphuric acid in relation to the raw phosphate (apatite) than for superphosphate made from ordinary raw materials, the iron content of which usually does not exceed 1.5 per cent.

Under these conditions the formation of dicalcium phosphate, $CaHPO_4$, which also is soluble in a solution of citrate of ammonia, but not in water, will not be possible because of the high acidity of the liquid phase, and the only compounds containing citrate-soluble phosphoric acid present in such superphosphate are compounds of iron (or alumina) with phosphoric acid.

If such superphosphate is exposed to a pressure of 15-20,000 kg. per sq. cm., a viscous, light red-brown liquid seeps out, containing between 30-35 per cent total P_2O_5.

In order to find out the nature of the compounds between iron and phosphoric acid which are in equilibrium with such a liquid the following method was used:—

The liquid phase of the superphosphate in question always contained a certain quantity of divalent iron formed during the action of sulphuric acid on magnetite (Fe_3O_4) in the apatite used:—

$$Fe_3O_4 + 4H_2SO_4 = FeSO_4 + Fe_2(SO_4)_3 + 4H_2O.$$

As long as the liquid phase is absorbed in the pores of the superphosphate the compounds of divalent iron dissolved in the liquid are not, or are only partly, oxidised, but if the liquid pressed out from the pores comes into contact with air, oxidation of divalent to trivalent iron proceeds rather quickly. Because of the saturation of the liquid with compounds between trivalent iron and phosphoric acid, this oxidation results in the precipitation of that compound of trivalent iron which is in equilibrium with the liquid phase in question.

The liquid phases which were pressed out from superphosphate rich in iron after different times and temperatures of storing, and the precipitates formed in these liquids after contact with air, were investigated. The results are given in Table 2.

From the analysis of the precipitates it can be concluded that diphosphatoferric

TABLE 2.

Number		1	2	3
Time of storage of superphosphate		3 days	1 month	1 month
Temp. "		room temp.	room. temp.	70°C.
Analysis of superphosphate	Percentage P_2O_5 total	16.50	15.79	15.72
	" " water- and citrate soluble	15.00	14.44	12.71
	" " water-soluble	9.22	7.41	8.11
	" " citrate soluble	5.78	7.03	4.60
	water and citrate-soluble P_2O_5, percentage of total	90.90	91.50	80.80
	Percentage free acids, expressed as equivalent amount P_2O_5	8.10	6.04	4.69
	" humidity (free water)	14.43	15.78	14.67
	" Fe_2O_3 total	4.89	5.27	5.43
	" " water- and citrate-soluble	3.55	4.45	2.82
	" " water-soluble	0.98	0.39	0.28
	" " insoluble	1.34	0.82	2.61
	water- and citrate-soluble Fe_2O_3, percentage of total	72.60	84.40	51.90
Analysis of liquid phase	Percentages P_2O_5 total	32.30	30.52	34.94
	" Fe_2O_3	7.62	4.61	3.47
	" SO_3	5.79	2.60	0.40
	" CaO	0	0	0.88
	" free H_3PO_4	25.85	30.84	40.90
Analysis of precipitates from liquid phase	Percentage P_2O_5	44.20	49.39	38.56
	" Fe_2O_3	23.60	28.40	34.41
	molecular proportion $P_2O_5 : Fe_2O_3$	2.10	1.96	1.26
	theoretical proportion for: $H_3[Fe(PO_4)_2]$	2.00	2.00	—
	$FePO_4$	—	—	1.00

acid was in the equilibrium with the liquids from 1 and 2, but ferric phosphate with the liquid from 3, though complete equilibrium had not been attained. Furthermore, it can be stated that diphosphatoferric acid from sample 1 was the form with 4 molecules of water of crystallisation (theoretical analysis: 43.3 per cent P_2O_5, 24.9 per cent Fe_2O_3), while that from sample 2 corresponded to the modification containing 2.5 molecules of water (theoretical analysis: 48.3 per cent P_2O_5, 27.2 per cent Fe_2O_3).

Diminishing P_2O_5

In accordance with the above conclusion the content of citrate-soluble P_2O_5 in the sample of superphosphate 3 per cent (4.60 per cent) had distinctly diminished as compared with samples 1 and 2 (5.78 per cent and 7.02 per cent respectively). The content of water- and citrate-soluble Fe_2O_3 had changed in the same proportion in all samples. This must be the consequence of the transformation of a great part of citrate-soluble diphosphatoferric acid into nearly insoluble ferric phosphate. The analysis of the precipitate shows that this transformation is not complete after 1 month's storing at 70°C. as the equilibrium is attained very slowly because of the high viscosity of the liquid phase.

The percentage content of Fe_2O_3 in the liquid phase of sample 1 was more than double the content of water- and citrate-soluble iron in the superphosphate itself. As the liquid phase in this superphosphate amounts to about half its weight, it becomes evident that nearly all "decomposed" iron is dissolved in the liquid phase. The liquid phase from sample 1 had a much higher content of Fe_2O_3 (7.62 per cent) than that from sample 2 (4.61 per cent). Probably the cause for this was the higher concentration of free sulphuric acid in the liquid from sample 1 as compared with that from sample 2 (7.22 per cent against 3.19 per cent H_2SO_4, see later), whereby more diphosphatoferric acid was dissolved.

Supersaturation with regard to diphosphatoferric acid in the liquid phase from sample 1 cannot be assumed to be the reason, because the rapid precipitation of this compound from the liquid after its exposure to the air (oxidation of acid ferrous phosphate to disphosphatoferric acid) proves that no tendency for supersaturation exists.

In the superphosphate corresponding to sample 2, the content of citrate-soluble P_2O_5 (and Fe_2O_3) had increased during storage, while the liquid phase showed a lower content of Fe_2O_3 as compared with sample 1. The first is the consequence of a continuing decomposition of the iron oxides in the apatite during storage, while the decrease of the content of iron in the liquid phase is caused by precipitation of diphosphatoferric acid.

The nature of the compounds between trivalent iron and phosphoric acid which were found to be in equilibrium with the liquid phases of samples 1 and 2 do not seem to agree with the results obtained by former authors[9] (Fig. 1). According to these, a liquid phase containing 25.85 per cent and 30.84 per cent free phosphoric acid respectively, should, at a temperature of 40°C., be in equilibrium with ferric phosphate, and not with diphosphatoferric acid. We must, however, remember that the liquid phases in these two samples contained considerable amounts of free sulphuric acid. These were the following in the three samples examined:

Sample 1 ... 7.22 per cent free H_2SO_4
" ... 3.19 " " " "
" ... 0.58 " " " "

Because of the high energy of hydration of this acid its presence means an increase of the concentration of the phosphoric acid present in the liquid phase. In this way the conditions for an equilibrium with diphosphatoferric acid as a solid phase prevailed in the liquids of samples 1 and 2. Due to the higher concentration of free sulphuric acid in sample 1 the diphosphatoferric acid precipitated corresponded to the 2.5-hydrate, while the 4-hydrate was in equilibrium with the liquid phase of sample 2 which contained only less than half the amount of free sulphuric acid. In sample 3 the concentration of free sulphuric acid was very low and did not influence perceptibly the conditions for the existence of ferric phosphate which had been found to be, at a temperature of 70°C., the solid phase in equilibrium with a solution containing up to 37.43 per cent P_2O_5 = 51.65 per cent H_3PO_4.[10]

Importance of Free H_2SO_4

The presence of free sulphuric acid in superphosphate is evidently of decisive importance in order to keep the iron/phosphoric compounds in a citrate-soluble state.

The presence of a rather high amount of free acid, especially sulphuric acid, was also the reason why a small part of the iron was dissolved when extracting the samples of superphosphate with water. This part decreased with falling concentration of free sulphuric acid in the superphosphate. In practice, this "water-solubility" of iron compounds has no importance.

The compounds of iron with phosphoric acid, which can occur in superphosphate, therefore always cause a direct loss of P_2O_5, if the product (superphosphate) is sold on the base of water-soluble P_2O_5 only.

When the conditions in the liquid phase of superphosphate change in such a manner that crystalline ferric phosphate becomes the stable solid instead of diphosphatoferric

(*Continued overleaf*)

NEW CARBON BISULPHIDE PROCESS

HIGHLY reactive carbon and its conversion to carbon bisulphide form the subject of the English patent application No. 19455/1947, in the name of Gt. Lakes Carbon Corporation.

A hydrocarbon or like material is treated with sulphur at suitable temperature. Preferred materials are hydrocarbons of the type normally liquid or liquifiable at relatively low temperature, such as coal tar- or petroleum pitch, or cracked residuum, having boiling points above 175°C., and softening points at or below 200°C. The use of relatively heavy hydrocarbons of an appreciably higher unsaturated character is preferred to paraffinic and saturated hydrocarbons, since the former require less sulphur. The latter are used in liquid form and mixed in stoichiometrical proportion to the hydrogen content of the hydrocarbon to form hydrogen sulphide. Even 60 per cent of the stoichiometrical proportion is sufficient to produce yields of some 85 per cent of theoretical carbon, of which 95 per cent is convertible to carbon bisulphide.

With increasing proportions of sulphur higher yields of more reactive and readily convertible carbon are obtained. The melted sulphur and hydrocarbon material are mixed in a suitable reaction zone at temperature of 150-260°C, stirred, and the reaction mixture is further gradually heated up to 640-1000°C. to decompose sulphurous compounds into hydrogen sulphide and carbon, and volatilise the gaseous mixture distilled. Too high a hydrogen content in the reaction must be avoided.

A suitable accelerating agent may be used as in rubber vulcanisation, such as benzothiazole derivatives. The highly reactive carbon may also be used for production of calcium carbide, ferro-alloys, silicon carbide, and many other products.

IRON COMPOUNDS (*Continued from page 699*)

acid, a certain increase of water-soluble P_2O_5 occurs simultaneously with the decrease of citrate-solubility, according to :—

$$H_3[Fe(PO_4)_2] \rightleftharpoons FePO_4 + H_3PO_4.$$

This is confirmed by the analysis of samples 2 and 3 (Table 2).

Finally, it must be pointed out that the precipitates formed in the liquid phase of the superphosphate investigated never contained any calcium, even if calcium was present in those liquids which contained a low amount of sulphuric acid (see sample 3). Earlier authors[11] have expressed the opinion that the cause of a decrease of the citrate-soluble P_2O_5 in superphosphate was the formation of an insoluble calcium salt of diphosphatoferric acid, *i.e.*, $Ca[H\,Fe(Po_4)_2]$. In consequence of the results of the present investigation, this cannot be the case. A decrease of the citrate-solubility of the phosphoric acid in superphosphate containing iron is, if dicalcium phosphate cannot occur, due only to the formation of crystalline ferric phosphate.

SUMMARY.

1. The compounds of trivalent iron with phosphoric acid, which play a part in the production and application of artificial phosphatic fertilisers, especially superphosphates, are the two modifications of ferric phosphate ($FePo_4.2H_2O$) and the complex diphosphatoferric acid ($H_3[Fe(PO_4)_2]$).

2. Ferric phosphate exists in an amorphous and a crystalline modification. The first-named is precipitated from solution containing $Fe^{...}$ and $PO_4^{'''}$ ions when the *p*H of the solution is 2 and more. It crystallises under the influence of heat.

The crystalline modification of ferric phosphate can also be obtained directly from solutions of iron in phosphoric acid containing an appropriate concentration of the acid (5-35 per cent).

3. With the help of X-ray powder-diagrams it has been proved that iron triphosphate is not an iron salt of diphosphatoferric acid.

4. The amorphous modification of ferric phosphate, and diphosphatoferric acid, are highly soluble in an ammoniacal solution of citrate of ammonia (Petermann's solution), while the crystalline form of ferric phosphate is practically insoluble.

Therefore, the decrease of citrate-soluble P_2O_5 in superphosphate containing iron, as well as of citrate soluble iron bound to phosphoric acid in the soil solution, is due to the formation of crystalline ferric phosphate. This has been proved by investigation of the liquid phase in superphosphates and the solid compounds of iron with phosphoric acid in equilibrium with that liquid.

5. In superphosphates containing more than a certain amount of free sulphuric acid (in excess of about 2.5 per cent SO_3 in the liquid phase) the compound of iron with phosphoric acid in equilibrium with the liquid phase was diphosphatoferric acid with 4 or 2.5 molecules of water or crystallisation, freely soluble in a solution of citrate of ammonia.

Decreasing content of free sulphuric acid in superphosphate induces the formation of the citrate-insoluble crystalline modification of $FePO_4.2H_2O$.

Storage at elevated temperature favours the decrease of free sulphuric acid in superphosphate (attack of non-decomposed raw phosphate) and therefore the formation of crystalline citrate-insoluble ferric phosphate.

6. In order to avoid a decrease of the content of citrate-soluble P_2O_5 in superphosphates containing iron it is therefore necessary to keep the content of free sulphuric acid so high that even after a long storage at elevated temperature ferric phosphate cannot be formed.

7. The compounds of iron and phosphoric acid occurring in superphosphates are practically insoluble in water. When, however, the conditions in the liquid phase of superphosphate change in such a manner that crystalline ferric phosphate becomes the stable solid instead of diphosphatoferric acid, an increase of water-soluble P_2O_5 occurs by the liberation of 1 mol. free H_3PO_4 per mol. $FePO_4$.

8. It has been proved that no calcium salts of diphosphatoferric acid are formed in superphosphate, which formerly had been considered to be the cause of decreasing citrate solubility.

PROSPECTS OF FISCHER-TROPSCH DEVELOPMENTS

DR. C. C. HALL SURVEYS U.S. AND GERMAN PROGRESS

WHILE the production of a very wide variety of synthetic chemicals, lubricants, detergents, soaps and other products by the Fischer-Tropsch process might be an economic possibility in this country, Dr. C. C. Hall, of the Fuel Research Station, Greenwich, told the Society of Chemical Industry, Glasgow Section, he saw no prospect of the process being developed here on the scale now contemplated in the U.S.A.

Dr. Hall was speaking on "Chemical Products from the Fischer-Tropsch Process," based on extensive research work in Germany, England and America, and visits to the various plants in Germany where this process was operated during the war years.

Wax production had been in the region of 46,000 tons per annum of soft wax and 26,000 tons of hard wax. Among the very widespread uses were the impregnation of paper, treatment of textiles and incorporation in polishes. These products had been used to replace natural waxes and the refined hard wax produced would command a high price in this country.

An important feature of the process was that it provided the only satisfactory method of obtaining lubricants from coal. In Germany 20,000 tons per annum of motor lubricating oils had been produced in this way.

The possibility of producing higher alcohols either directly or *via* the "Oxo" process was a significant factor. The C_{12} to C_{18} alcohols were of particular value for the manufacture of detergents and a plant to produce 12,000 tons per annum of these alcohols by the Oxo process had been built in Germany. Oxo alcohols were generally considered to be somewhat inferior to those derived by direct synthesis. Many possibilities were, however, being explored for the further utilisation of the reaction.

Source of Soap Material

The production of fatty acids for soap manufacture had been an important feature of the work done in Germany. Owners of certain Fischer-Tropsch plants had recovered the trace of fatty acids present in the products to make soap for their own workers. The main source had been the oxidation of soft wax. Study of this synthesis had been intensified and bulk of production had gone into soap manufacturing. While no unpleasant effects had been evident when used on textiles, an unpleasant odour developed when the soap, so made, was used for toilet purposes.

The Germans had claimed that certain types used had eliminated this unfavourable effect, but even so, the reaction varied according to the individuals concerned. He cited the instance of one employee in a large plant whose acute sensitivity to these synthetic soaps made her extremely valuable to the factory as a "guinea pig."

Soap had been produced by a variety of processes and methods and by suitable combination, a considerable proportion of Fischer-Tropsch products could be converted into fatty acids. These might not be entirely acceptable to British users, but in the present acute shortage would ease supply.

Detergents

Dr. Hall covered the very considerable production of detergents by the process, stressing particularly the sulpho-chlorinated type, Mersol. While relatively inferior and strongly alkaline, it had the virtue of cheapness and was produced at a cost in the region of £38 per ton, as against prices 100 per cent greater by other methods.

He drew attention to the petroleum industry attitude that all these or similar products could be obtained from suitable fractions of petroleum and the necessity to consider the economics of the relative processes in any development as between Fischer-Tropsch and petroleum processes.

The interest created by this survey was evident in the questions raised. Dr. Hall told inquirers that while the Germans had been able to demonstrate interesting developments from the chemical engineering viewpoint, and had devised newer processes such as the Oxo synthesis they were not in advance of British chemists on the fundamental side. In some instances their experts were behind British development.

He did not think that low temperature tar or cannel could offer the same prospects as were achieved by the Fischer-Tropsch process for the products described.

Asked whether methane would offer a suitable starting point for the process, he pointed out the difficulty that in this country methane, wherever it was available, became rated on the basis of its calorific value and would be as expensive a raw material as coal. Methane gas was being used to power the sludge plants where the gas was generated, and the diversion of methane from these power units would demand its replacement by electrical, or other power.

Asked whether the German synthetic detergent product was superior to petroleum-based detergents, Dr. Hall recalled the difficulty of giving any general opinion, but stressed the excellent performance of the sulphonated primary alcohol types which could not be derived from petroleum.

GLASS IN THE LABORATORY—VIII

Bench Moulding as an Aid to Glass Blowing

by I. C. P. SMITH, B.Sc., F.R.I.C.

THE use of moulds to secure uniformity in blown glass articles when made from the furnace is universal, and as far as the chemist is concerned this applies to all such articles as beakers, flasks, bottles, measuring flasks, and cylinders, Scheibler-type vacuum dessicators, Kipps apparatus and a host of others. It is not always realised, however, that small moulds can be useful for blowing articles on the bench from tubing.

High-Temperature Needed

The moulds themselves have special characteristics which require to be studied. First, when made from cast-iron or other metal they must be heated externally, as a fairly high temperature is required in order to produce a smooth surface on the glass, and the required heat cannot be obtained from the glass, as in heavy furnace blowing practice. The metal must therefore be resistant to corrosion and to distortion on prolonged heating at temperatures approaching redness.

Such metals are available in Lunz iron, for example, a fine grain, easily worked cast iron, and in certain of the alloyed steels. They are usually made of lighter or thinner construction as the articles produced are lighter, and the moulds are not subjected to such hard use. Moulds have also been made from a hard graphite, and from wood. They are heated only by the hot glass and it is difficult to produce a nicely finished article; moreover wear is rapid.

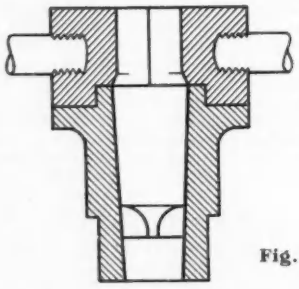


Fig. 1.

Fig. 1 shows in section a mould employed for producing the cone part of a standard ground joint. It consists of a tapered part in one piece, a stop dropped into the cone to determine the lower end, and a pair of shoulder pieces to shape the glass between the cone and the tubing; these last must open and close easily. In Fig. 2 is shown one form of set-up for ensuring this, the movement being a parallel one, the shoulders having blocks which are made to slide in suitably disposed channels by means of long levers.

Alternatively, the shoulders may be pivoted from the body of the mould, the pivot being in line with the division between the two parts of the shoulder. The mould is suitably cowled or boxed round with sheet steel covered by asbestos, so that heat from the burner underneath is carried to all parts of the mould and taken away clear of the operator by a short chimney at the back. A temperature near the lower annealing point of the glass is usually required.

Variable Stops for Cones

In producing standard cones, the stop is varied in form according to the finish required. The one shown will produce a cone which will be cut to the ordinary square open end or to an open bevel. Others will produce a rim of slightly smaller diameter than the lower end of the grinding for strength, or for joining a narrow tube to the tip; or the stop may be domed to form the slightly concave bottom of a stopper. The shoulders may likewise also be varied in shape, but must always have the first bevelled section adjacent to the cone, to determine nicely the end of the grinding.

Above this the finish may be cylindrical as in that shown to form a standard cone on a tube, or it may be given the shape of a stopper handle or an adaptor or some other form required in an apparatus. Fig. 3 shows some of the shapes which may be produced.

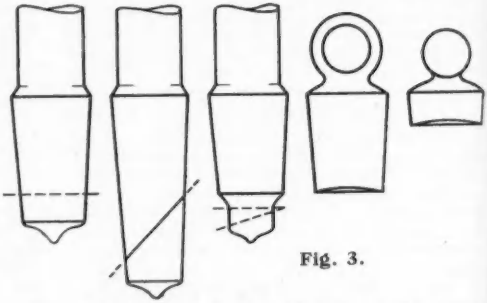


Fig. 3.

One advantage of the mould construction

in Fig. 2 is that a number of moulds of different sizes may be made to fit interchangeably in the one platform or fixture, covering a number of the standard sizes.

In Fig. 4 is shown a mould suitable for blowing a large squat weighing bottle, an

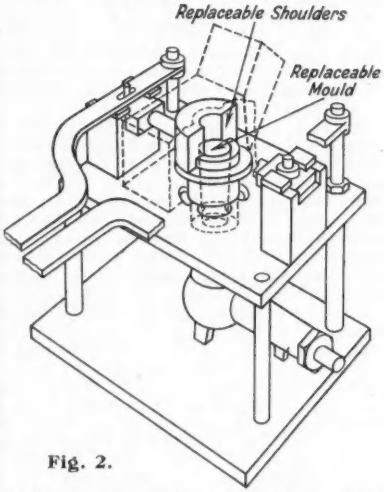


Fig. 2.

article often a problem to produce in large quantities by ordinary handworking methods, owing to the large diameter of tubing required and the fact that it is frequently not truly round in section. In using the mould, smaller diameter tubing may be employed; very little size selection is required in this tubing, and a well-shaped article which is easy to grind is always produced. The finish at the top is obtained by cutting through the glass at the bead formed by the small semi-circular channel shown on the mould.

Large Stoppers

Fig. 5 shows a method of producing a large stopper, which is blown complete with a flat handle. These moulds follow closely the types used for blowing from the furnace, but are of lighter construction and provision is made, as mentioned above, for heating by means of a burner.

The operation of blowing the glass into the mould is usually one which can be mastered in a much shorter time than that required for the usual forms of scientific glass-blowing; the main reason for this is that once the worker has learned to pull good "spears" by which the glass is best handled, the manipulation of the glass is a one-handed job.

With practice, quite large billets of glass can be heated in the blowpipe flame and blown into the mould to produce a perfectly even and well-formed article. Small articles are usually blown by mouth but sometimes a lead from the compressed air supply is fixed to the end of the "spear" *via* a swivel and worked by a foot-operated valve. If the mould has been well conditioned with a layer of colloidal graphite and is maintained at a suitable temperature, a sparkling finish on the article may be obtained.

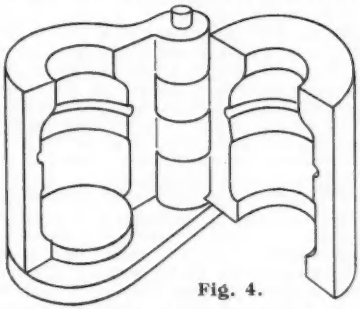


Fig. 4.

In most hand-blowing operations the glass is dropped and blown vertically into the mould, but it is possible to employ a lathe set-up in which a glass tube is rotated horizontally and heated. When at a suitable juncture, a mould carried in the tailstock is slipped over the glass and compressed air is applied to expand the glass into the mould while it is still held horizontally.

Many small articles are blown from tubing in a completely mechanical way, examples being the miniature electric light bulbs which are manufactured on multi-stage machines and rely on the careful setting of numerous burners to produce the right stage of melting of the glass at the right time. For these purposes, glass is carefully selected in large batches for exact diameter and weight of wall, so that a machine will run for a long time at a given setting and produce reasonable uniformity in the result.

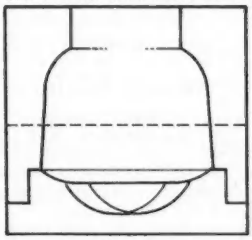


Fig. 5.

Previous articles in this series appeared on March 29, May 31, July 5, August 2, August 30, September 27, and October 25.

Figures 1, 5 and 6 in "Glass in the Laboratory—VII" were reproduced by courtesy of Messrs. A. Gallenkamp & Co., Ltd., and Fig. 8 by courtesy of Messrs. Townson & Mercer, Ltd.

LETTERS TO THE EDITOR

Survey of Scientific Man-Power

SIR,—I have recently received the above questionnaire from the Ministry of Labour. While I am wholeheartedly in favour of the compilation of such statistics, I am concerned that the established professional organisations appear to have been by-passed in this matter.

Before the war the co-operation of these bodies was sought in the initiation of a Central Register, but once formed these bodies appear to have been denied any controlling interest. On the other hand the medical profession appears to have retained throughout the war an effective control in the direction and recruitment of medical men. I can see no case for differentiation between the medical profession and that of chemists.

The data now being sought is of considerable interest to the professional associations. Only a few weeks ago a similar survey was carried out by the Royal Institute of Chemistry, and like surveys have been made by the British Association of Chemists. So far as I am aware, the data compiled by the Central Register have not been made available to the bodies concerned in its initiation, nor have the records been open to inspection by them.

In my view, if these data are to be collected, it should be done through the professional bodies, and the results should be available to them. The number of chemists entitled to full membership of the two bodies mentioned is not known, as the Central Register includes many who are lacking in both training and experience. Both bodies have statistical committees who would be interested to know. If no one body exists capable of covering the whole field, it is high time chemists formed such a body, by joint action. I have inquired of both these bodies whether any such joint action is contemplated, and until I have their reply I do not propose to complete my form.—Yours truly,

H. L. HOWARD.

58 Hyde Vale, Greenwich, London, S.E.10.

"Mineral Wealth"

SIR,—As outlined under "Mineral Wealth" in THE CHEMICAL AGE of November 8, the Geological Survey Board's efforts on behalf of British minerals, constitute a matter of the utmost importance and are deserving of the highest praise.

During the past four years in particular we have publicly advocated the development of domestic barytes, in association with galena, and we are glad to note that the much overdue revival of interest in the North Pennine orefields, is at last taking more practical shape.

That there is a super-abundance of barytes awaiting exploitation in England and Scotland requires no confirmation by us. While this renewed interest should be encouraged and expanded, surely the time has passed for continuance of those old and discredited practices in use to-day, which have proved so wasteful of an otherwise valuable asset. We have, all along, stressed the urgent need for the application of modernised technology, calculated not only to increase greatly the commercial value of the raw material, but also to extend its use in home and foreign markets.

We believe the present backward position is largely due to the barytes industry being led by a limited number of technicians. We intend no reflection when we affirm our belief that an understanding of mining does not adequately replace the essential modern technical knowledge, both as regards the proper classification of the mineral lodes, and the subsequent purification of the mineral selected for economical manufacture of a valuable white finely milled powder.

Much scientific work is involved in the required preliminary investigations to be made at the source which, if suitably followed up, would bear an exceedingly good dividend, besides raising the standard of domestic barytes much above that of their foreign rivals.

To look upon barytes as the exclusive perquisite of lithopone and chemical manufacturers, to be mined and sold to them in the crude state, must, in our opinion, be adverse to both the mine owners and the national interest, whereas provided extended and systematic operations be carried out the interests of all consumers of lithopone, chemical and purified white fine ground barytes would be adequately safeguarded. Mines situated far distant from the actual consumers could become paying propositions and much increase the supply of the raw material.—Yours faithfully,

(Signed) WALTER REYNOLDS & SON.

70 High Street, Uttoxeter, Staffs.

STILL IN THE LEAD

BRITAIN leads the world in the field of communal research for industry, said Sir Arthur Fleming, Director of the Research and Education Department, Metropolitan-Vickers Electrical Co., Ltd., in the last of a series of lectures arranged by the Institute of Industrial Administration (Merseyside Centre) at Radiant House, Bold Street, Liverpool. "We are not so sure of our place in the field of pure science," said Sir Arthur. "America has gone ahead enormously in the last few years. In applied research, America is spending a good deal more money than we are, and in my view is forging ahead faster than we are."

HOME NEWS ITEMS

Benzene Explosion Verdict.—A verdict of "death by misadventure" was returned at the inquest on the three victims of the recent explosion at the London chemical works of A. Boake Roberts & Co., Ltd.

Another Blast Furnace.—A second blast furnace at Dixon's Iron Works, Glasgow, is expected to be in operation within the next few weeks and the Ministry of Supply is co-operating to obtain sufficient coke to enable the company to start.

Coal Output Progress.—Production of coal last week totalled 4,246,700 tons (4,041,000 tons from deep mines), which compares with 4,258,200 tons for the previous week. Only 23½ million tons are now required to reach the Government target of 200 millions for the year.

Sheet Steel Prospects.—Mr. J. W. Belcher, Parliamentary Secretary to the Board of Trade, speaking at Erith (Kent) last week, said the shortage of sheet steel was such that only firms which can offer a good export performance are likely to get anything like the amount of steel and other materials which they would like to have.

Rubber Study Group.—A permanent secretariat in London of the Rubber Study Group has been established at Brettenham House, Lancaster Place, W.C.2, the headquarters of the London Rubber Secretariat, whose staff and offices has been taken over by the Study Group to provide national and international liaison in administrative affairs in the industry.

I.C.I. Seeking New Property.—Cheshire County Council has considered an application by Imperial Chemical Industries, Ltd., to purchase or lease Vale Royal, Northwich, which the county council acquired for police headquarters and afterwards considered using as a children's home. Both these projects have now been abandoned. The clerk of the council has been authorised to negotiate with I.C.I. for the lease or sale of the hall and approximately 10 acres of land.

Geneva Tariff Schedules.—A White Paper on the Geneva Tariff negotiations and on the General Agreement on Tariffs and Trade was published last week. Copies of the schedules giving details of the new tariff rates are now available for consultation at the Chambers of Commerce of nearly all large cities and at the following regional offices of the Federation of British Industries: Newcastle-on-Tyne, Leeds, Bradford, Sheffield, Nottingham, Leicester, Cambridge, London, Reading, Bristol, Birmingham, Manchester, Liverpool, Glasgow. Copies of the Schedules are, of course, also available at the Export Promotion Department of the Board of Trde, 35 Old Queen Street, London, S.W.1.

CELANESE DEVELOPMENTS

IN his address to the 28th annual general meeting of British Celanese, Ltd., in London last week, Mr. G. H. Wigham, the chairman, said that it had always been the company's practice to follow a vigorous research and development policy, and that in the past year such a policy had been "energetically maintained" in chemicals, plastics and textiles. The programme had included increased production of cellulose acetate and other chemicals at Spondon, where it was hoped maximum planned production will be achieved by the end of next year. A plastics plant is now operating at Wrexham.

Magnesium Venture Suspended

Largely as a result of a virtual cessation of demands for additional supplies of magnesium metal by U.K. users, Imperial Smelting Corporation after consultation with the British Aluminium Company, has decided to suspend its joint plans with the Magnesium Metal Corporation to operate that organisation's carbothermic process for magnesium production. An additional consideration is that overseas demands during the next few years are not likely to provide promising outlets.

Australian Colliery Prospects

The prospect of substantial development of Australian coal mining, probably stimulated by large investment from this country, is associated with the impending flight to Brisbane of Mr. Robert Foot, of Powell Duffryn Technical Services, Ltd., to study a new coal deposit at Callide, North Queensland. Preliminary examination by the district geologist indicates that the seam here is 60 ft. thick and one part of the field of only one quarter of a sq. mile may yield 6½ million tons. Two small Australian companies have started to exploit the field, which is one of several potential sources, by open-cast methods.

Herring Oil Extraction

The Herring Industry Board is now experimenting at Yarmouth with machinery for the extraction of oil from herring by chemical reduction. This is the outcome of a visit officials of the board paid to herring oil extraction plants in Scandinavia a year ago. If successful, the result will be a very considerable increase in the production of home-produced oil, not only for human consumption, but also for use in industry, notably for linoleum and paint.

Personal

MR. J. W. BOYLE has become a director of Shell Transport and Trading Co.

MR. JAMES BRUCE, chemical salesman, 14 Calderwood Road, Newlands, Glasgow, has left £13,727.

MR. A. JOLLIE, of Coldingham, Berwickshire, a director of United Steel Companies, Sheffield, left £90,115.

MR. R. A. G. TILNEY has been appointed a director of Associated Portland Cement Manufacturers, Ltd., in succession to MR. W. G. CHAPMAN who has resigned.

MR. ARNOLD PETRIE, of Jesmond, Newcastle-on-Tyne, area sales manager for the building products section of Imperial Chemical Industries Ltd., has died at the age of 53.

MR. JOHN BURKE, 25-year-old clerk at the Monsanto Chemical Works, Cefn Mawr, has gained a Rockefeller Foundation award of £300 for novel-writing. He is leaving chemical industry in order to devote all his time to writing.

DR. HANS FLUCK, professor of pharmacognosy in the Faculty of Pharmacy of the Swiss Federal Technical Institute, Zurich, has been awarded the Daniel Hanbury gold medal of the Pharmaceutical Society of Great Britain for "high excellence" in drug research.

Reorganisation of the directorate of the British Coal Utilisation Research Association has resulted in the setting up of the following executive officers: Director general, DR. D. T. A. TOWNEND; director of research laboratories, DR. D. H. BANGHAM; director of engineering laboratories, DR. E. G. RITCHIE; director of domestic appliance laboratories, MR. J. S. HALES; secretary and finance officer, MR. H. T. HATHAWAY.

U.S. Chemical Awards

The American Institute of Chemical Engineers has awarded the William H. Walker Award to Dr. M. Benedict and Mr. L. C. Rubin for their work on distillation. Both men were formerly employed by the M. W. Kellogg Company of New York, Dr. Benedict being well known in chemical engineering circles for his successful work on the diffusion process for concentrating uranium 235. Mr. Rubin is still the company's manager of research.

The awards are specifically related to two papers published in 1945 entitled "Extractive and Azeotropic Distillation," Part I—"Theoretical Aspects," and II—"Separation of Toluene from Paraffins by Azeotropic Distillation with Methanol."

"Metrovick" Appointments

MR. J. BILLINGTON, the company's purchasing agent, who is to retire on December 31, will be succeeded by the contracts manager, MR. G. T. KING, whose post will be filled by his present assistant, MR. H. LAWSON-JONES. Mr. Billington, Mr. King and Mr. Lawson-Jones have between them served the company for about 78 years. Since August, 1945, Mr. Billington has also been chairman of the A.E.I. Group Purchasing Committee, which co-ordinates purchasing activities throughout Associated Electrical Industries, Ltd.

Oil-Milling Machinery

HYDRAULIC press-type machinery is being replaced in France by continuous presses and expellers and by the solvent extraction process. A first and scond pressing are often employed, according to oil content of seeds and nuts. The new presses recently delivered from the U.S.A. are said to be capable of removing most of the oil in one pressing; results are awaited. In the preliminary operations of cleaning, decortication, etc., among the best known French makes of apparatus are those of Terrin, Samat (Marseilles) Egrot, and Olier.

For the milling process itself, the Egrot and Olier machines (including heaters and cortification, etc., among the best-known though some American machines such as the Anderson are regarded with favour. The most commonly used extraction solvent is a "special essence distilling between 60 and 80°C." It is probably derived from petroleum. Extraction methods can be grouped under four headings, viz: fixed plant, combined plant, rotary apparatus, and continuous type (Olier, Egrot, Hansa-Muhle, Smet, and American).

* From articles by Ives Bagot in *Chim et Ind.*, Aug. and Sept. 1947, and based on a paper read by the author at the Centre de Perfectionnement Technique.

Obituary

The death occurred on November 22, 1947, at Wayside, Oxted, of MISS EMMA IRENE BENN, in her 84th year, last surviving child of the Rev. Julius Benn and sister of Sir John Williams Benn, founder of Benn Brothers, Ltd. (proprietors of THE CHEMICAL AGE). Miss Benn served the firm as clerk in the early stages of its development and continued to take a keen interest in affairs, and particularly in the progress of the publishing business she had helped to found, until the last few days of her life.

Swiss Export Tax Abolished.—A Swiss Federal decree of October 31, 1947, provides that the export duty of 30 francs per quintal imposed by the decree of November 10, 1936, on copper vitriol and "fungivorous" products (No. 20 in Export Tariff) has been abolished as from November 1, 1947.

Parliamentary Topics

Soda Ash Shortage.—The distribution of soda ash supplies is under review in the light of the expanding needs of the consuming industries. There is no prospect, however, that total home production will appreciably increase until new capacity planned for 1949 comes into operation. No assurance can be given that soda ash will not be diverted into export channels because it is a valuable commodity in bilateral negotiations now proceeding with certain countries.—Mr. H. Wilson.

Harwell: "Developments Continuing."—The Minister of Supply considers that it will not be in the public interest to disclose the total estimated cost of the atomic energy research establishment at Harwell. It is not possible at present to say when the work will be completed as developments are continuing.—Mr. C. W. Key.

Exports of Oils and Fats.—The 13,000 tons of oils and fats (less than 2 per cent of U.K. consumption), which it is anticipated will have been exported by the end of the current year, will be distributed as follows: Mediterranean Colonies 6970 tons, Far East and Burma 2700 tons, Africa 1040 tons, Caribbean 595 tons, Middle East countries 815 tons, and other Colonies (including Faroes) 990 tons.—Mr. J. Strachey.

Steel Supplies.—U.S. steel producers have contracted to supply substantial quantities of steel to this country. It is not in the public interest to disclose the exact tonnages involved. Deliveries this year have averaged 16,500 tons per month.—Mr. J. Jones.

Groundnut Stocks, Nigeria.—Unshipped stocks of groundnuts in the Kano area of Nigeria on November 1, 1946, amounted to 10,000 tons. The peak stock figure was reached in February of this year when there were 208,000 tons, a figure which had dropped to 98,000 three weeks ago. During the twelve-month period ended November 1, 1947, 225,000 tons had been shipped.—Mr. Creech Jones.

Uganda Cottonseed.—Disposal of all Uganda cottonseed and its products is under Government control. All cottonseed cake is produced by local crushing, and it is exported to Kenya as cattle food.—Mr. Creech Jones.

African Phosphates.—A geological survey of phosphate deposits in Uganda has been carried out and is being studied with a view to production of fertilisers.—Mr. Creech Jones.

Industrial Subsidies.—Existing subsidies to industries include: iron and steel £7,500,000, ferro-chrome £100,000, magnesium £250,000 and aluminium £750,000.—Sir Stafford Cripps.

Next Week's Events

MONDAY, DECEMBER 1

Society of Chemical Industry (London Section). Burlington House, Picadilly, W.1, 6.30 p.m. A. J. P. Martin: "Partition Chromatography."

Institution of the Rubber Industry (Manchester and District Section). Grand Hotel, Manchester, 6.15 p.m. Annual dinner-dance.

TUESDAY, DECEMBER 2

Institute of Welding. Reynolds Hall, Manchester College of Technology, 7 p.m. H. St. G. Gardner, W. Hart, E. J. Heeley and W. L. McIvor: "Brains Trust."

Society of Dyers and Colourists (Huddersfield Section). Field's Cafe, Westgate, Huddersfield, 7.30 p.m. Dr. W. Baird: "Modern Developments in Synthetic Detergents." Scottish Section. St. Enoch Hotel, Glasgow, 7 p.m. Dr. K. W. Richmond: "Modern Trends in Hydrogen Peroxide Application."

Paint Research Association. Gas Industry House, 1, Grosvenor Place, London, W.1, 4 p.m. Annual general meeting.

WEDNESDAY, DECEMBER 3

Society of Public Analysts and The Society of Chemical Industry (Food Group). Rooms of the Chemical Society, Burlington House, Piccadilly, W.1, 7 p.m. G. E. Forstner: "The Occurrence of Metallic Contaminants in Foodstuffs"; G. W. Monier-Williams: "The Public Health Aspect of Metallic Contaminants in Foodstuffs"; W. F. J. Cuthbertson: "Trace Metals in Human Nutrition"; and N. L. Allport and D. C. Garrett: "The Estimation of Metallic Contaminants in Foodstuffs."

THURSDAY, DECEMBER 4

The Chemical Society (London Section). Burlington House, Piccadilly, W.1, 7.30 p.m. Sir Ian Heilbron: "Recent Developments in the Vitamin A Field" (Pedlar Lecture). (Nottingham Section.) Chemistry Lecture Theatre, University College, Nottingham, 6 p.m. Original papers.

FRIDAY, DECEMBER 5

Society of Chemical Industry, Chemical Society and Royal Institute of Chemistry. Lecture Hall, Albert Hall, Manchester, 6.30 p.m. Sir Wallace Akers: "The Generation of Useful Power from Atomic Energy."

SATURDAY, DECEMBER 6

Royal Institute of Chemistry. The University, Reading, 3 p.m. Professor E. A. Guggenheim: "The Atomic Nucleus."

STEEL MAKES A NEW RECORD

STEEL production in October—equivalent to an annual rate of 14,316,000 tons—was the highest of any of the monthly totals. This continues on an accelerated scale the marked improvement in steel production in recent months, which resulted in output at the rate of 13,841,000 tons in September. The rate in October a year ago was 13,226,000 tons. Pig iron production last month at the level of 8,352,000 tons annually, compared with 7,805,000 in September. The rate in October, 1946, was 8,102,000 tons.

Overseas News Items

Slow-Down.—France's aluminium production, which during the summer months was maintained at an average of 8000 tons per month, will probably be reduced by half during the winter owing to the electricity shortage.

Rubber Stocks Rising.—A marked rise in Malayan rubber stocks last month is indicated in the official figures just issued by the Malayan Government, showing total stocks on September 30 (long tons, dry weight) of 147,677, comparing with 90,418 on August 31 last.

Vancouver Pulp Mill.—A three-million dollar pulp-board plant, the first of its kind west of Ontario and Quebec is to be built in the Vancouver area. It will convert sawmill and plywood waste, now sold as pulp chips or for fuel, into soft or hard board for building purposes.

New French Fertiliser Deposits.—The exploitation has recently started at Dax, Landes Department on the Atlantic Coast of France, of extensive 12-m. potassium deposits. Production is reported to aggregate about 100 metric tons per day. The deposits are said to contain a high percentage of nitrogen, which makes them especially valuable as a fertiliser, more particularly for the growing of sugar-beet and grapes.

Danish Penicillin.—The Roskilde Medicinal Kompagni, a Danish enterprise, is at present erecting a penicillin plant. It is hoped to commence export shipments in the spring.

U.S. Sulphur Production Up.—For the third consecutive month output of U.S. native sulphur in September (406,964 long tons) surpassed the previous month's production (391,396 long tons) and established a new record. The figure for September, 1946, was 335,300.

Exports from Cyprus.—Exports of merchandise from Cyprus in 1946 (in comparison with 1945) included the following: iron pyrites 256,203 tons (100,075), asbestos 6606 tons (3445). Iron pyrites went mainly to France, Belgium and Switzerland, while asbestos was shipped to Denmark, the U.K., Eire and Jugoslavia.

Chemical Problem Competition.—The setting of a chemical engineering problem by a committee of U.S. industrial engineers presided over by Dr. Mott Souders, jr., of the Shell Development Co., of California, resulted in three students—Mr. W. J. Terrell, Mr. E. F. Macbeth, and Mr. M. E. Brooks—receiving 1st, 2nd and 3rd of the A. MacLaren White awards of the American Institute of Chemical Engineers recently. The problem concerned the design of hydrogen purification plant.

Company News

The name of **Dr. Phillips Research Corporation, Ltd.**, research chemists, 1 Angel Court, London, E.C.2, has been changed to Phillips Research Corporation, Ltd., as from November 4, 1947.

The name of **Merbart Products, Ltd.**, mineral and chemical substances, etc., 131 Victoria Street, London, S.W.1, has been changed to Merbart, Ltd., as from November 1, 1947.

Genatosan, Ltd., is maintaining its dividend at 50 per cent for the year ended June 30 last. Trading profit amounted to £100,479 compared with £151,987 for the previous year.

O. & M. Kleemann, Ltd., manufacturers of plastic goods and materials, proposes to pay a final dividend of 150 per cent, making a total of 250 per cent for the year ended August 31, 1947. Last year's total dividends amounted to 80 per cent. This year's gross profit totalled £504,587 by contrast with £265,061 in the previous year.

A majority interest in the firm of **James M. Brown, Ltd.**, manufacturers of zinc oxides, cadmium and selenium colours, oxides and salts, has been purchased by one of the Charles Tennant and Co. group of companies.

The nominal capital of **Welwyn Plastics, Ltd.** (formerly Sealite, Ltd.), Wellite Works, Woodside Road, Welwyn North, has been increased beyond the registered capital of £1000 by £24,000 in £1 ordinary shares.

The nominal capital of **Quickstryp Chemical Co., Ltd.**, 104 Morley Street, Bradford, has been increased beyond the registered capital of £4000, by £21,000, in £1 ordinary shares. On October 22, 1947, J. Manger and Son, Ltd., were allotted 17,875 fully paid shares, as consideration for certain property.

The nominal capital of **Syntics, Ltd.**, manufacturers of plastics and synthetic resins, etc., 4 Reece Mews, South Kensington, London, S.W.7, has been increased beyond the registered capital of £10,000 by £2000 in £1 6 per cent cumulative participating preference shares.

The Solvay Process Co., and **Solvay Sales Corporation** have been merged into their parent company, **Allied Chemical & Dye Corporation**, and will continue under the name of The Solvay Process Division, Allied Chemical & Dye Corporation and Solvay Sales Division, Allied Chemical & Dye Corporation respectively, with no change in personnel.

New Companies Registered

Halwood Chemicals, Ltd. (445,173).—Private company. Capital 1000. Manufacturers of and dealers in insecticides, soaps, fats, chemicals, gases, drugs, medicines, oils, colours, etc. Directors: G. J. Fritchard, J. Kendriek and P. F. Cansdale. Registered office: 6 Eldon Street, E.C.2.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

KAY (WEST END) LABORATORIES, LTD., London, N., film printers. (M., 29/11/47.) October 23, debenture to Westminster Bank Ltd., securing all moneys due or to become due to the Bank; general charge. *Nil. December 3, 1946.

THOMAS ROBINSON (MANUFACTURING CHEMISTS), LTD., Manchester. (M., 29/11/47.) October 28, £2500 (not ex.) charge, to Lloyds Bank Ltd.; charged on land and buildings thereon known as Boundary Works, Boundary Street East, Chorlton-on-Medlock.

Chemical and Allied Stocks and Shares

THE main business in stock markets again centred on industrial shares, owing partly to another batch of good dividend announcements, and partly to the encouraging turn in the coal output figures. Shares of companies expected to benefit substantially from the end of E.P.T. have been favoured, and in some cases the market is talking of improved dividends despite the doubled Profits Tax. British Funds receded, buyers holding off, pending next Monday's announcement of redemption terms in respect of the £300 millions of 3 per cent Conversion Loan.

Imperial Chemical remained active and further strengthened to 50s. 6d. and now yield slightly less than 4 per cent on the basis of last year's 10 per cent total distribution. B. Laporte were 82s. 6d., and W. J. Bush 85s.; Fisons further strengthened to 67s., and the recently-issued 4½ per cent preference to 24s. 9d., British Xylonite rose further to £7⅜, with the new shares 32s. premium, the latter having now more than doubled in price since the commencement of dealings. O. & M. Kleemann 1s. shares were also active around 33s. 1½d. following the big profit increase reported by this plastics company and the raising of the dividend from 80 per cent to 250 per cent. Elsewhere, De La Rue were better at 48s. 1½d. The units of the Distillers Co. rose to 29s. 6d., United Molasses were better at 50s. 9d., Dunlop Rubber were 77s. 9d., while British Aluminium have been firm at 49s., with Borax Consolidated deferred good at 54s. 4½d. on higher dividend hopes. British Glues & Chemicals 4s. shares came into renewed demand and rose to 23s. 9d. Greeff-Chemicals 5s. shares remained firm at 15s., and William Blythe 3s. shares were again quoted at 15s. 3d. British Plaster Board 5s. ordinary were 22s. 6d., while in other directions, British Oxygen moved up to 103s. 9d.

Iron and steels have been favoured in view of their attractive yields and the uptrend in coal output. United Steel were 27s., Dorman Long 28s. 6d., Guest Keen 48s. 6d., while T. W. Ward rose further to 53s. 6d., and George Cohen strengthened to 19s. 9d. buyers being attracted by reports of the big demand for scrap metals. Allied Ironfounders rose to 57s. 9d., Babcock & Wilcox have been good at 73s. 6d.. with Ruston & Hornsby 67s. 6d., Stewarts & Lloyds 56s. 6d., and Tube Investments £6⅞. In other directions, Lever & Unilever were better at 54s. 9d., Boots Drug (59s. 3d.) rallied after an earlier small decline, but Griffiths Hughes fell to 36s. 3d. following the "cut" in the interim dividend.

Helped by the very heavy application for the company's 4½ per cent preference shares (which are being issued at par) Beechams deferred have been firm at 22s. 6d. The market was impressed by the official news of continued growth in the export side of the business. Turner & Newall have risen further to 79s. 4½d., and Amalgamated Metal firmed up to 18s., while General Refractories at 22s. 6d. have been firm, Triplex Glass 10s. shares changed hands around 32s. 9d. There was again considerable activity in oil shares in view of the pending big Royal Dutch-Shell issues. Shell rallied to 78s. 1½d., Burmah Oil to 74s. 4½d., while V.O.C. were 99s. 4½d., and Wakefield touched 78s. 1½d.

Prices of British Chemical Products

STEADY markets have prevailed during the past week with a good aggregate volume of inquiries both for home account and for shipment. Consumers' delivery specifications under existing contracts have covered fair quantities, and on the production side the position appears to be a little more promising. Supplies of bichromate of soda and also chlorate, yellow prussiate, sulphide and sulphate of soda are rather tight with avaiable quantities carefuily allocated, and similar conditions continue to obtain among the potash compounds. There has been a brisk demand for the white and red leads at unchanged quotations, and offers of lithopone are insufficient to meet the present demands. Barium chloride is a good market while hydrogen peroxide, bleaching powder, arsenic, formaldehyde and acetone remain in firm request. So far as prices are concerned, there have been no important changes reported, but the undertone is distinctly strong. The coal-tar products market has little of fresh interest to record. Practically all items have a ready outlet and pitch in particular is enjoying a good export demand.

MANCHESTER.—Chemical traders on the Manchester market during the past week have reported a steady flow of delivery specifications from the textile and allied trades and from other leading outlets. Home and export inquiries regarding new business have also been in evidence and these have covered the alkalis as well as the other principal heavy products, with a steady trade passing also in the lighter classes. The general tone of the market, so far as prices are concerned, is distinctly firm. There is a brisk demand for basic slag and agricultural lime in the fertiliser market, and in the tar products trade buying interest in pitch, creosote oil and the tar acids is maintained at a good level.

GLASGOW.—Conditions generally have been quiet in the Scottish chemical market during the week. Difficulties, however, are being experienced with chemicals which have been in short supply for some time, and for which the demand is increasing, due to the stepping up in the production rate of the firms using these materials. Chemicals particularly affected are bleaching powder and sodium hypochlorite. In the export market, there is also little to report, although inquiries are now coming in from Spain, as a result of the Spanish Government's policy to include chemicals in its priority import list.

Price Changes

Rises: Ammonium bicarbonate, arsenic, barium, carbonate, barium sulphate (dry blanc fixe), copper carbonate, formic acid, glycerine, lead nitrate, oxalic acid and pyridine.

Reductions: Copper sulphate, sodium nitrate and carbolic acid.

General Chemicals

Acetic Acid.—Maximum prices per ton: 80% technical, 1 ton, £56 10s.; 80% pure, 1 ton, £58 10s.; commercial glacial 1 ton £70; delivered buyers' premises in returnable barrels: **£4 10s. per ton extra if packed and delivered in glass.**

Acetone.—Maximum prices per ton, 1/5 tons, £86 10s.; single drums, £87 10s.; delivered buyers' premises in returnable drums or other containers having a capacity of not less than 45 gallons each. For delivery in non-returnable containers of 40/50 gallons, the maximum prices are £3 per ton higher. Deliveries of less than 10 gallons free from price control.

Alum.—Loose lump, £16 per ton, f.o.r. MANCHESTER: £16 10s.

Aluminium Sulphate.—Ex works, £11 10s. per ton d/d. MANCHESTER: **£11 10s.**

Ammonia, Anhydrous.—1s. 9d. to 2s. 3d. per lb.

Ammonium Bicarbonate.—MANCHESTER: £41 per ton d/d.

Ammonium Carbonate.—£42 per ton d/d in 5 cwt. casks. MANCHESTER: Powder, £43 d/d.

Ammonium Chloride.—Grey galvanising, £22 10s. per ton, in casks, ex wharf. Fine white 98%, £21 to £25 per ton. See also Salammoniac.

Ammonium Persulphate.—MANCHESTER: **£5** per cwt. d/d.

Antimony Oxide.—£162 10s. per ton.

Arsenic.—Per ton, £40 5s. to £41 5s. according to quality, ex-store.

Barium Carbonate.—Precip., d/d; 2-ton lots, £24 15s. per ton, bag packing, ex works.

Barium Chloride.—98/100% prime white crystals, 4-ton lots, £19 10s. per ton, bag packing, ex works.

Barium Sulphate (Dry Blanc Fixe).—Precip., 4-ton lots, £22 per ton d/d; 2-ton lots, £24 15s. per ton.

Bleaching Powder.—Spot, 35/37%, £11 to £11 10s. per ton in casks, special terms for contract.

Borax.—Per ton for ton lots, in free 1-cwt. bags, carriage paid: Commercial, granulated, **£30**; crystals, **£31**; powdered, **£31 10s.**; extra fine powder, **£32 10s.** B.P., crystals, **£39**; powdered, **£39 10s.**

extra fine, £40 10s. Borax glass, per ton in free 1-cwt. waterproof paper-lined bags, for home trade only, carriage paid: lump, £77; powdered, £78.

Boric Acid.—Per ton for ton lots in free 1-cwt. bags, carriage paid: Commercial, granulated, £52; crystals, £53; powdered, £54; extra fine powder, £56. B.P., crystals, £61; powder, £62; extra fine, £64.

Calcium Bisulphide.—£6 10s. to £7 10s. per ton f.o.r. London.

Calcium Chloride.—70/72% solid, £5 15s. per ton, ex store.

Charcoal, Lump.—£25 per ton, ex wharf. Granulated, £30 per ton.

Chlorine, Liquid.—£23 per ton, d/d in 16/17 cwt. drums (3-drum lots).

Chrometan.—Crystals, 5½d. per lb.

Chromic Acid.—1s. 10d. to 1s. 11d. per lb., less 2½%, d/d U.K.

Citric Acid.—Controlled prices per lb., d/d buyers' premises. For 5 cwt. or over, anhydrous, 1s. 6¾d., other, 1s. 5d.; 1 to 5 cwt., anhydrous, 1s. 9d., other, 1s. 7d. Higher prices for smaller quantities.

Copper Carbonate.—MANCHESTER: 1s. 8d. per lb.

Copper Oxide.—Black, powdered, about 1s. 4½d. per lb.

Copper Sulphate.—£42 10s. per ton f.o.b., less 2%, in 2 cwt. bags.

Cream of Tartar.—100 per cent., per cwt., from 201s. to 205s. per cwt. lots, d/d.

Formaldehyde.—£28 to £29 per ton in casks, according to quantity, d/d. MANCHESTER: £29 10s.

Formic Acid.—85%, £55 per ton for ton lots, carriage paid.

Glycerine.—Chemically pure, double distilled 1260 s.g., 123/1 per cwt. Refined pale straw industrial, 5s. per cwt. less than chemically pure.

Hexamine.—Technical grade for commercial purposes, about 1s. 4d. per lb.; free-running crystals are quoted at 2s. 1d. to 2s. 3d. per lb.; carriage paid for bulk lots.

Hydrochloric Acid.—Spot, 7s. 6d. to 8s. 9d. per carboy d/d, according to purity, strength and locality.

Hydrofluoric Acid.—59/60%, about 1s. to 1s. 2d. per lb.

Hydrogen Peroxide.—1s. per lb. d/d, carboys extra and returnable.

Iodine.—Resublimed B.P., 10s. 4d. to 14s. 6d. per lb., according to quantity.

Lactic Acid.—Pale tech., £70 per ton; dark tech., £60 per ton ex works; barrels returnable.

Lead Acetate.—White, 110s. to 115s. per cwt., according to quantity.

Lead Nitrate.—About £115 per ton d/d in casks. MANCHESTER: £115.

Lead, Red.—Basic prices per ton: Genuine dry red lead, £106; orange lead, £118. Ground in oil; Red, £132; orange £144. Ready-mixed lead paint: Red, £140; orange, £152.

Lead, White.—Dry English, in 8-cwt. casks, £116 10s. per ton Ground in oil, English, in 5-cwt. casks, £141 per ton.

Litharge.—£103 10s. to £106 per ton, according to quantity.

Lithium Carbonate.—7s. 9d. per lb. net.

Magnesite.—Calcined, in bags, ex works, £18 5s.

Magnesium Chloride.—Solid (ex wharf), £27 10s. per ton.

Magnesium Sulphate.—£12 to £14 per ton.

Mercuric Chloride.—Per lb., for 2-cwt lots, 7s. 6d.; smaller quantities dearer.

Mercurous Chloride.—8s. 10d. to 9s. per lb., according to quantity.

Mercury Sulphide, Red.—Per lb., from 10s. 3d. for ton lots and over to 10s. 7d. for lots of 7 to under 30 lb.

Methylated Spirit.—Industrial 66° O.P. 100 gals., 4s. 4d. per gal.; pyridinised 64° O.P. 100 gals., 4s. 5d. per gal.

Nitric Acid.—£24 to £26 per ton, ex works.

Oxalic Acid.—£110 to £121 per ton packed in free 5-cwt. casks. MANCHESTER: £5 5s. per cwt.

Paraffin Wax.—Nominal.

Phosphorus.—Red, 3s. per lb. d/d; yellow, 1s. 10d. per lb. d/d.

Potash, Caustic.—Solid, £65 10s. per ton for 1-ton lots; flake, £76 per ton for 1-ton lots. Liquid, d/d, nominal.

Potassium Bichromate.—Crystals and granular, 9¾d per lb.; ground, 10¾d. per lb., for not less than 6 cwt.; 1-cwt. lots, ½d. per lb. extra.

Potassium Carbonate.—Calcined, 98/100%, £64 per ton for 1-ton lots, ex store; hydrated, £58 for 1-ton lots

Potassium Chlorate.—Imported powder and crystals, nominal

Potassium Iodide.—B.P., 8s. 8d. to 12s. per lb., according to quantity.

Potassium Nitrate.—Small granular crystals, 76s. per cwt. ex store, according to quantity.

Potassium Permanganate.—B.P., 1s. 8½d. per lb. for 1-cwt. lots; for 3 cwt. and upwards, 1s. 8d. per lb.; technical, £7 14s. 3d. to £8 6s. 3d. per cwt., according to quantity d/d.

Potassium Prussiate.—Yellow, nominal.

Salammoniac.—First lump, spot, £48 per ton; dog-tooth crystals, £50 per ton; medium, £48 10s. per ton; fine white crystals, £21 to £25 per ton, in casks, ex store.

Salicylic Acid.—MANCHESTER: 2s. 2d. to 3s. 0d. per lb. d/d.

Soda, Caustic. — Solid 76/77%; spot, £18 4s. per ton d/d.

Sodium Acetate.—£42 per ton, ex wharf.

Sodium Bicarbonate.—Refined, spot, £11 per ton, in bags.

Sodium Bichromate.—Crystals, cake and powder, 8d. per lb.; anhydrous, 7½d. per lb., net, d/d U.K. in 7-8 cwt. casks.

Sodium Bisulphite. — Powder, 60/62%, £19 10s. per ton d/d in 2-ton lots for home trade.

Sodium Carbonate Monohydrate.—£25 per ton d/d in minimum ton lots in 2 cwt. free bags.

Sodium Chlorate.—£45 to £47 per ton.

Sodium Hyposulphite.—Pea crystals 22s. 6d. per cwt. (2 ton lots); commercial, 1-ton lots, £17 per ton carriage paid. Packing free.

Sodium Iodide.—B.P., for not less than 28 lb., 10s. 2d. per lb.

Sodium Metaphosphate (Calgon).—11d. per lb. d/d.

Sodium Metasilicate.—£18 per ton, d/d U.K. in ton lots.

Sodium Nitrite.—£22 10s. per ton.

Sodium Percarbonate.—12½% available oxygen, £7 per cwt.

Sodium Phosphate.—Di-sodium, £30 10s. per ton d/d for ton lots. Tri-sodium, £35 per ton d/d for ton lots (crystalline).

Sodium Prussiate.—9d. to 9½d. per lb. ex store.

Sodium Silicate.—£6 to £11 per ton.

Sodium Sulphate (Glauber Salt).—£8 per ton d/d.

Sodium Sulphate (Salt Cake).—Unground. Spot £4 11s. per ton d/d station in bulk MANCHESTER: £4 15s. per ton d/d station.

Sodium Sulphide. — Solid, 60/62%, spot, £22 2s. 6d. per ton, d/d, in drums; crystals, 30/32%, £15 2s. 6d. per ton, d/d, in casks.

Sodium Sulphite.—Anhydrous, £29 10s. per ton; pea crystals, £20 10s. per ton d/d station in kegs: commercial, £12 to £14 per ton d/d station in bags.

Sulphur.—Per ton for 4 tons or more, ground, £14 12s. 6d. to £16 17s. 6d., according to fineness.

Sulphuric Acid.—168° Tw., £6 2s. 8d. to £7 2s. 8d. per ton; 140° Tw., arsenic-free, £4 15s. per ton;; 140° Tw., arsenious, £4 7s. 6d. per ton. Quotations naked at sellers' works.

Tartaric Acid.—Per cwt., for 10 cwt. or more, £15 8s.; 5 to 10 cwt., £15 9s. 6d.; 2 to 5 cwt., £15 11s.; 1 to 2 cwt., £15 13s. Less than 1 cwt., 3s. 1d. to 3s. 3d. per lb. d/d, according to quantity.

Tin Oxide.—1 cwt. lots d/d £25 10s.

Zinc Oxide.—Maximum prices per ton for 2-ton lots, d/d; white seal, £68 15s.; green seal, £70 5s.; red seal, £71 5s.

Zinc Sulphate.—No quotation.

Rubber Chemicals

Antimony Sulphide.—Golden, 3s. to 4s. per lb. Crimson, 2s. 7½d. to 3s. per lb.

Arsenic Sulphide.—Yellow, 1s. 9d. per lb.

Barytes.—Best white bleached, £8 8s. 6d. per ton.

Cadmium Sulphide.—6s. to 6s. 6d. per lb.

Carbon Bisulphide.—£37 to £41 per ton, according to quality, in free returnable drums.

Carbon Black.—6d. to 8d. per lb., according to packing.

Carbon Tetrachloride.—£50 10s. to £53 10s per ton, according to quantity.

Chromium Oxide.—Green, 2s. per lb.

India-rubber Substitutes.—White, 10 5/16d to 1s. 5½d. per lb.; dark, 10½d. to 1s per lb.

Lithopone.—30%, £32 17s. 6d. per ton.

Mineral Black.—£7 10s. to £10 per ton.

Mineral Rubber, "Rupron."—£20 per ton.

Sulphur Chloride.—7d. per lb.

Vegetable Lamp Black.—£49 per ton.

Vermilion.—Pale or deep, 15s. 6d. per lb for 7-lb. lots.

Nitrogen Fertilisers

Ammonium Phosphate.—Imported material 11% nitrogen, 48% phosphoric acid per ton in 6-ton lots, d/d farmer's nearest station, in December £20 4s. 6d. rising by 2s. 6d. per ton per month to March, 1947.

Ammonium Sulphate.—Per ton in 6-ton lots d/d farmer's nearest station, in December £9 18s. 6d., rising by 1s. 6d., per ton per month to March, 1947.

Calcium Cyanamide.—Nominal; supplies very scanty.

ER 1947

or more.
17s. 6d.,

s. 8d. to
, arsenic-
40° Tw.,
quotations

cwt. or
5 9s. 6d.;
2 cwt.,
s. 1d. to
quantity.
s.

ton for
£68 15s.;
£71 5s.

to 4s.
to 3s.

per lb.
3s. 6d.

per lb.

per ton,
eturnable

according

£53 10s.
.
lb.
0 5/16d
d. to 1s.

ton.

ton.

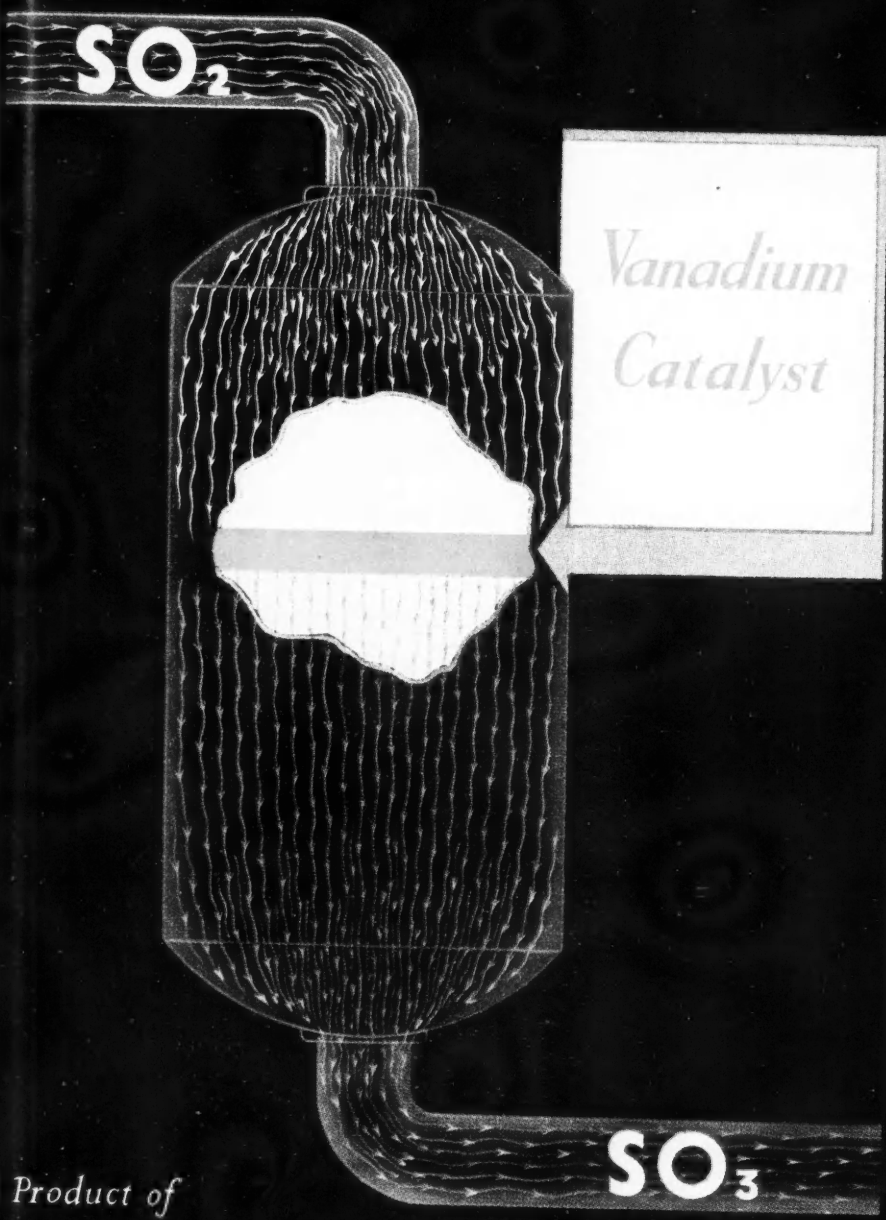
er ton.

n.
per lb

material,
ic acid,
farmer's
4s. 6d.,
month to

ton lots,
Decem-
6d., per

lies very



A Product of

IMPERIAL SMELTING CORPORATION LTD.

37, Dover Street, London, W.1.

Concentrated Fertilisers.—Per ton d/d farmer's nearest station, I.C.I. No. 1 grade, where available, £14 18s. 6d.

"Nitro Chalk."—£9 14s. per ton in 6-ton lots, d/d farmer's nearest station.

Sodium Nitrate.—Chilean super-refined for 6-ton lots d/d nearest station, £17 5s. per ton; granulated, over 98%, £16 per ton.

Coal-Tar Products

Benzol.—Per gal. ex works: 90's, 2s. 6d.; pure, 2s. 8½d.; nitration grade, 2s. 10½d.

Carbolic Acid.—Crystals, 11½d. per lb. Crude, 60's, 3s. 6d. to 4s. MANCHESTER: Crystals, 9½d. to 11½d. per lb., d/d; crude, 4s. 3d., naked, at works.

Creosote.—Home trade, 6½d. to 9½d. per gal., according to quality, f.o.r. maker's works. MANCHESTER, 6½d. to 9½d. per gal.

Cresylic Acid.—Pale, 97%, 3s. 6d. per gal.; 99%, 4s. 2d.; 99.5/100%, 4s. 4d. American, duty free, 4s. 2d., naked at works. MANCHESTER: Pale, 99/100%, 4s. 4d. per gal.

Naphtha.—Solvent, 90/160°, 2s. 10d. per gal. for 1000-gal. lots; heavy, 90/190°, 2s. 4d. per gal. for 1000-gal. lots, d/d Drums extra; higher prices for smaller lots. Controlled prices.

Naphthalene.—Crude, ton lots, in sellers' bags, £8 1s. to £12 13s. per ton according to m.p.; hot-pressed, £14 15s. to £15 14s. per ton, in bulk ex works; purified crystals, £28 to £43 5s. per ton. Controlled prices.

Pitch.—Medium, soft, home trade, 75s. to 80s. per ton f.o.r. suppliers' works; export trade, £7 10s. per ton f.o.b. suppliers' port. MANCHESTER: 77s., 6d. f.o.r.

Pyridine.—90/140°, 18s. per gal.; 90/160°, 14s. MANCHESTER: 15s. to 18s. 6d. per gal.

Toluol.—Pure, 3s. 2½d. per gal.; 90's, 2s. 4d. per gal. MANCHESTER: Pure, 3s. 2½d. per gal. naked.

Xylol.—For 1000-gal. lots, 3s. 3½d. to 3s. 6d. per gal., according to grade, d/d.

Wood Distillation Products

Calcium Acetate.—Brown, £15 per ton; grey, £22.

Methyl Acetone.—40/50%, £56 to £60 per ton.

Wood Creosote.—Unrefined, from 3s. 6d. per gal., according to boiling range.

Wood Naphtha.—Miscible, 4s. 6d. to 5s. 6d. per gal.; solvent, 5s. 6d. to 6s. 6d. per gal.

Wood Tar.—£6 to £10 per ton.

Intermediates and Dyes (Prices Nominal)

m-Cresol 98/100%.—Nominal.

o-Cresol 30/31° C.—Nominal.

p-Cresol 34/35° C.—Nominal.

Dichloraniline.—2s. 8½d. per lb.

Dinitrobenzene.—8½d. per lb.

Dinitrotoluene.—48/50° C., 9½d. per lb; 66/68° C., 1s.

p-**Nitraniline.**—2s. 5d. per lb.

Nitrobenzene.—Spot, 5½d. per lb. in 90-gal. drums, drums extra, 1-ton lots d/d buyer's works.

Nitronaphthalene.—1s. 2d. per lb.; P.G., 1s. 0½d. per lb.

o-**Toluidine.**—1s. per lb., in 8/10 cwt. drums, drums extra.

p-**Toluidine.**—2s. 2d. per lb., in casks.

m-**Xylidine Acetate.**—4s. 5d. per lb., 100%

Removing Antifriction Bearings

A more economical and time-saving method of removing large antifriction bearings from machines—in minutes instead of hours—is now being applied by an increasing number of manufacturers in Philadelphia. By pressuring oil from a hand-operated pump between the bore of the bearing and the shaft on which it is mounted, the inner ring expands and "floats" on the oil film, enabling the operator to remove the bearing with greater ease and in less time. The method introduced to industry by the ball and roller bearing firm SKF, is also successful for coupling two shafts together. The application of oil at 7000 to 8000 lb. per sq. in. reduces dismounting time to 10 or 15 minutes as compared with several hours required by the former method involving use of pullers and hydraulic jacks.

EDUCATIONAL

Great Possibilities for
QUALIFIED CHEMICAL ENGINEERS

VAST and far-reaching developments in the range of peacetime productions and markets of the Chemical Industry mean that the profession of Chemical Engineering will be of great importance in the future and one which will offer the ambitious man a career of outstanding interest and high status. The T.I.G.B. offers a first-class training to candidates for the Chemical Engineering profession.

Enrol with the T.I.G.B. for the A.M.I.Chem.E. Examinations in which home-study students of the T.I.G.B. have gained a record total of passes including—

FOUR "MACNAB" PASSES
and
THREE FIRST PLACES

Write to-day for the "Engineers' Guide to Success"—free—containing the world's widest choice of Engineering courses—over 200—the Department of Chemical Technology, including Chemical Engineering Processes, Plant Construction, Works Design and Operation, and Organisation and Management—and which alone gives the Regulations for A.M.I.Chem.E., A.M.I.Mech.E., A.M.I.F.E., C. & G., B.Sc., etc.

THE TECHNOLOGICAL INSTITUTE
OF GREAT BRITAIN
219, Temple Bar House, London, E.C.4

SITUATIONS VACANT

None of the vacancies in these columns relates to a man between the ages of 18 *and* 50 *inclusive, or a woman between the ages of* 18 *and* 40 *inclusive, unless he or she is exempted from the provisions of the Control of Engagement Order, or the vacancy is for employment exempted from the provisions of that order.*

A VACANCY occurs i n an East London factory for a Graduate with wide experience in the analysis of fine chemicals, raw materials, and essential oils. Applicants should state full details of qualifications, experience and salary required. Write Box PH.878, DEACONS ADVERTISING, 36, Leadenhall Street, E.C.3.

CEREBOS LIMITED require two qualified Assistant Chemists for their factory in the North East of England for technical development and routine analysis. The senior of these appointments requires some previous industrial experience and in both cases assistance may be given in connection with the housing problem. Contributory pension scheme. Salary from £375 to £500 per annum, according to qualifications and experience. Applications, giving full details of age, education, qualifications, experience, etc., to Manager, CEREBOS LIMITED, Greatham, via Billingham-on-Tees, Co. Durham.

CHEMIST REQUIRED for Mufulira Copper Mines Limited, Northern Rhodesia. Qualifications B.Sc. in Chemistry. Starting salary £37 10s. per month if inexperienced, £42 10s. if applicant has one year's experience, plus pension, bonus and cost of living privileges, and subject to two half-yearly increments of £2 10s. per month to £42 10s. and £47 10s. respectively. Official application form from Mufulira Copper Mines Limited, Selection Trust Building, Mason's Avenue, London, E.C.2.

FIRM in Home Counties invites applications from qualified Chemists, preferably (but not necessarily) with some experience in organic or physical chemistry, for research on Plastic Materials. Permanent position with attractive salary and good prospects. Apply in strict confidence, giving usual particulars. Box No. 2557, THE CHEMICAL AGE, 154, Fleet Street, London, E.C.4.

JUNIOR Assistant, inter-standard, required for works laboratory, 15 miles S.E. London. Preferably two or three years' practical experience. Work partly analytical, and assisting research on wide range of topics. Box No. 2556, THE CHEMICAL AGE, 15 ndon, E.C.4.

SITUATIONS VACANT

PLANT Chemists urgently required for Process Plant Operation by large company operating in the Middle East. Applicants need not be Graduates but should have had a chemical training up to Inter. B.Sc. or National Certificate Standard with experience of shift work in either a gas, coke oven or chemical works. Age not over 30. Salary in sterling between £540 and £600 per annum, plus generous allowances in local currency, with free furnished bachelor accommodation, passages out and home, medical attention, also kit allowance and Provident Fund benefits. Apply, stating age, qualifications and experience, etc., to Dept. F.22, Box No. 2435, THE CHEMICAL AGE, 154, Fleet Street, London, E.C.4.

RESEARCH Chemist required by large tar distillation and oil refining company. Applications in writing to: THE PERSONNEL MANAGER, The Midland Tar Distillers Ltd., Oldbury, Birmingham.

FOR SALE

MORTON, SON & WARD LTD.
— OFFER —
NEW MIXING PLANT FOR SALE

ONE—Gardner "Rapid" Steam Jacketed Mixer, 6 ft. long × 2 ft. 3 in. wide × 2 ft. 6 in. deep.
ONE—Porteous Unit similar to above but with stainless steel covers.
TWO—100 gall. Steam Jacketed Mild Steel open top Mixing Pans, certified 100 lb. per sq. in. W.P. 3 ft. dia. × 3 ft. deep.
SIX—200 gall. unjacketed Mild Steel Open Top Unjacketed Mixers, 3 ft. dia. × 4 ft. 6 in. deep: 2 in. bottom outlets.
TWO—200 gall. unjacketed enclosed welded pressure mixers or Autoclaves. Conical bottom, 3 ft. dia. × 2 ft. 11 in. on straight × 10 in. deep cone portion.
ONE—40 gall. steam jacketed welded mild steel mixing pan, 2 ft. dia. × 2 ft. deep. 40 lb. per sq. in. W.P.

MORTON, SON & WARD LTD.
WALK MILL, DOBCROSS
Nr. Oldham.
'Phone—Saddleworth 437.

AUTOCLAVE, vertical, cast steel 39 in. I.D. by 5 ft. 6 in. deep, not jacketed, bolted cover, high pressure, as new £80. THOMPSON & SON (Millwall) Ltd., Cuba Street, Millwall, London, E.14.

CHARCOAL, ANIMAL and VEGETABLE, horticultural, burning, filtering, disinfecting, medicinal, insulating; also lumps ground and granulated; established 1830; contractors to H.M. Government.—THOS. HILL-JONES, LTD., "Invicta" Mills, Bow Common Lane, London, E. Telegrams, "Hill-Jones, Bochurch, London." Telephone: 3285 East.

METAL Powders and Oxides. Dohm Limited, 167 Victoria Street, London, S.W.1.

PROMPT DELIVERY—New Stainless Steel Storage Vessels, size 8 galls. to 6,000 galls.
GEORGE COHEN, SONS & COMPANY, LTD.
4, Sunbeam Road, Park Royal, N.W.10.

NEW AND SECONDHAND
CHEMICAL PLANT
Send Your Specific Enquiries To
REED BROTHERS
(ENGINEERING) LIMITED
BEVIS MARKS HOUSE · LONDON, E.C.3.
Telephone AVEnue 1677/8

FOR SALE

TWO Steam Jacketed **ROTARY VACUUM DRYERS**, each 17 ft. 3 in. long × 4 ft. 6 in. dia. Manhole in barrel with cover; mounted on roller tracks and driven through glanded trunnion bearings; end discharge is effected through steam jacketed discharge chamber.

One single effect Salt Water **WEIR EVAPORATOR**, 2 ft. 6 in. int. dia. × 5 ft. 6in. high. Capacity approx. 20/25 tons in 24 hours. Multi banks of copper steam coils secured into common C.I. headers. Coils easily renewable by removing inspection door. Spare coils available. Unit complete with Distiller Condenser 12 in. dia. × 4 ft. 9 in. between tube plates, complete with relief valve, and one Combination Brine and Fresh Water Pump by Weir. All complete with sundry equipment but excluding interconnecting piping.

One Sabroe Co2 **REFRIGERATING COMPRESSOR**, No. 126663, on baseplate, direct driven by 28/34 K.W. 220 volts, D.C. motor by Danziger Werft No. 634285, new 1939, 240/360 r.p.m. Complete with Evaporator and Condenser but excluding interconnecting piping and valves. Rated for a capacity of 12.2 tons of ice making in 24 hours and 24.4 tons refrigeration in 24 hours. With temperature of evaporation at −15°C and temperature of liquid from condenser at plus 30° C. Makers Thos. T. H. S. Sabroe, Aarhus, Denmark.

One Automatic **CHEMICAL ETCHING PLANT**, complete with endless chain Conveyor carrying stainless steel basket which conveys the castings for automatic dipping. Electrical equipment consists of 3 h.p. Crompton Parkinson **"TORK"** Squirrel Cage Motor, 400/3/50, 460 r.p.m. direct coupled to two gear boxes, each of which is fitted with a magnetic brake. This drives chain conveyor and controls dipping process. Governing dipping period is a "Venner" time switch, type GR. 400/440/3/50. Plant is complete with fume exhaust equipment comprising 30 h.p. Crompton Parkinson Squirrel Cage 400/3/50 Motor, driving a Fan. All electrical equipment complete with necessary starting gear, switches, cut-offs, etc. Details of dipping tanks are as follows:—

One Mild Steel Soda Tank 5 ft. × 6 ft. 6in. × 3 ft.
One Mild Steel Cold Water Tank, 5 ft. × 3 ft. × 3 ft.
Two Porcelain Nitric Acid Tanks, 5 ft. × 3 ft. × 3 ft.
One Porcelain Cold Water Tank, 5 ft. × 3 ft. × 3 ft.
One Mild Steel Ammonia Tank, 5 ft. × 3 ft. × 3 ft.
One Mild Steel Boiling Water Tank, 5 ft. × 3 ft. × 3 ft.
Eleven Stainless Steel Baskets available, 4 ft. × 2 ft. 2in. × 2 ft.

Overall dimensions of complete plant, 50 ft. × 10 ft. × 16 ft.

One **VACUUM PUMP** by Alley & MacLellan, single stage, size 2, No. 7095, having a displacement of approx. 200 cu. ft. per min., Vacuum 27 in. on 30 in. barometer, speed 500 r.p.m. Complete with Lancashire Dynamo and Crypto Screen protected type motor, 10 h.p., 1460 r.p.m., 400/3/50. Slide rails and wall mounting starting gear.

One Inclined Triple Steel Roll **REFINING MILL** by Geo. Mann & Co. Ltd. Rolls 24 in. × 10 in. with hand screw adjustment. Fast and loose pulley driven through gearing.

One Triple Granite Roll **REFINING MILL** by Brinjes and Goodwin. Rolls 20 in. × 7 in. with hand screw adjustment. Fast and loose pulley driven through gearing.

One **CAKE BREAKER**, size 5 N3, fitted with one set of roller breakers 15 in. long × 4 in. dia. with spikes inter-meshing, complete with scrapers. Machine geared and driven through fast and loose pulleys. 19 in. dia. × 3½ in. face. Mounted on cast iron frame.

One **OIL CAKE BREAKER** by G. Thurlow & Sons, size B.6. Fitted with two crushing rollers 15 in. long × 3½ in. dia. having approx. ⅞ in. inter-meshing spikes mounted vertically over two finer crushing rolls, 15 in. long × 3½ in. dia. with approx. ⅞ in. teeth. Rolls geared and driven from fast and loose pulleys 18 in. dia. × 3 in. face. Mounted on cast iron frame.

GEORGE COHEN SONS & CO. LTD.
SUNBEAM ROAD, N.W.10
and STANNINGLEY, nr. LEEDS.

FOR SALE

NEW Stainless Steel Vertical Cylindrical Tanks, 25, 50 and 100 gallon capacity, either with handles, or mounted in rubber castored cradle.
Also Stainless Steel Water-jacketed Pans with similar capacity, arranged for heating by water, oil, gas, electricity or steam.
Also Mild Steel Jacketed Pans for 50 lb. and 80 lb. working pressure, 20/300 gallons capacity.
DELIVERY from stock.
Wanted to purchase second-hand chemical plant—best prices given.

THE MANICRAFT ENGINEERING COMPANY LIMITED
Pryme Street Mills, off Chester Road, Hulme, Manchester, 15.

'Phone 98 Staines.

RECTANGULAR Jacketed Vacuum Oven 7 ft. × 3 ft. 6 in. × 3 ft.
400 feet of 18 in. 6 in. Pitch Gravity Roller Conveyor.
400 feet of 14 in. 4 in. Pitch Gravity Roller Conveyor.
Jacketed C.I. Pans 27 in. × 30 in., 25 in. × 20 in. and 4 ft. × 4 ft.
Welded Steel Jacketed Pans 25 in. diameter × 24 in. deep.
Bone Digester 8 ft. high × 4 ft. diameter, 100 lb. w.p.

HARRY H. GARDAM & CO. LTD.
STAINES.

2 Vertical Stearine Presses.
1 Hydraulic Baling Press.
1 Shirtliffe Baling Press.
42 in. Under-driven Hydro.
Jacketed Mixing Pan, 7 ft. dia., 9 ft. deep.
7 various Filter Presses.
12 Vertical Weir & Hall Steam Pumps.
Several small Steam-jacketed Copper Pans.
Several Ball Mills, 6 ft. 6 in. by 6 ft. 8 in., Silex-lined batch type, with driving gear and clutch.
Two set 2-pair high Breaking Rolls, 33 in. long.
One 18-in. 4-roll Cake Cracking Mill.
One 36-in. dia. Swan Neck Hydro Extractor.
Five Large Filter Presses.
Rectangular Storage Tank, 128-tons capacity.
Ditto, 108-tons capacity.
Ditto, 62-tons capacity.
Sectional ditto, 16-tons capacity.
3 Johnson Horizontal Oil Filter.
Presses fitted 24 plates 36" diameter.
1 Ditto fitted 24 plates 36" square.
Six Simon type Portable Slat Conveyors, 20 ft. long, for boxes or bags.
Three Circular Filter Presses fitted 24 plates 36 in. dia.
Lacey-Hulbert Motorised Compressor, capacity 4 cu. ft., 2,000 lb. pressure.
Mixing Pan, 6 ft. diameter by 5 ft. deep, flat bottom, open top.
Ditto, 3 ft. diameter by 5 ft. deep, flat bottom, open top.
No. 3 Miracle Mill, "Super" Hammers, no Cyclone.
2 Cyclone Collectors, 8 ft. 3 in. diameter, 15 ft. deep, 12-in. bottom outlets.
2—6-in. Centrifugal Pumps by Cherry.
Enclosed Drum Mixer, 8 ft. long, 5 ft. diameter, welded construction, copper lined.

Write: RICHARD SIZER LIMITED, ENGINEERS, CUBER WORKS, HULL

20 Welded Steel jacketed Pans, 40 gall., tested 100 lb. hydraulic pressure on three legs; bottom outlet £20 each. THOMPSON & SON (MILLWALL) LTD., Cuber Street, London, E.14.

CHEMICAL LEAD BURNING LEAD-LINED TANKS, ETC.

IMMEDIATE SERVICE OFFERED

H. G. FOWLER & Co. Phone CLE 5609
2 Newcastle Row, Clerkenwell, LONDON, E.C.1

FOR SALE

SALE—Contents of modern oil mill, including: 16 Anglo-American Hydraulic Presses by Greenwood & Batley, 16 in. rams and 15 rolled steel plates; two steam-jacketed Double Cooking Kettles; two automatic Cake Moulding Machines; a set of high and low pressure Hydraulic Accumulators; three sets vertical 2-throw Hydraulic Pumps; two automatic Cake Paring Tables; ten various Chain and Bucket and Belt and Bucket Elevators; 30-in. 2-pair Cake Cracking Mill; two sets of Kibblers 2-pair high 12 in. rolls; 32 in. square Filter Press by Johnson; 36 in. square Filter Press by Johnson; two Westinghouse 2-phase 200 volt Squirrel Cage Motors, 100 h.p. and 110 h.p., each with Auto Transformer Starters. Very reasonable prices.

RICHARD SIZER, LIMITED, ENGINEERS, CUBER WORKS, HULL.

TWO as new, Horizontal Steam Jacketed Mixers by Gardner & Sons of Gloucester, having a mild steel trough 5 ft. × 3 ft. 8 in. × 4 ft. 4 in. deep, bottom discharge with dust cover with spiral type blades driven through gear wheel and pinion from fast and loose pulleys 3 ft. diameter × 7½ in. face with outboard bearing.

REED BROTHERS (ENGINEERING) LTD.
Bevis Marks House,
LONDON, E.C.3.

1000 STRONG NEW WATERPROOF APRONS, To-day's value 5s. each, Clearing at 30s. dozen. Also large quantity Filter Cloths, cheap. Wilsons, Springfield Mills, Preston, Lancs. Phone 2198.

SERVICING

GRINDING, Drying, Screening and Grading of materials undertaken for the trade. Also Suppliers of Ground Silica and Fillers, etc. JAMES KENT, LTD., Millers, Fenton, Staffordshire. Telegrams: Kenmill, Stoke-on-Trent. Telephone: 4253 and 4254, Stoke-on-Trent (2 lines).

GRINDING of every description of chemical and other materials for the trade with improved mills.—THOS. HILL-JONES, LTD., "Invicta" Mills, Bow Common Lane, London, E. Telegrams: "Hill-Jones, Bochurch, London." Telephone: 3285 East.

LONDON FIRM offers complete service packing powders of all descriptions, also liquids and chemicals. Long runs only. Containers and packing cases for home and export, made on premises. Near to docks. Own rail sidings. Box No. 2331, THE CHEMICAL AGE, 154, Fleet Street, London, E.C.4.

PULVERISING and grinding of raw materials.—DOHM LTD., 167, Victoria Street, London, S.W.1

WANTED

FORMALDEHYDE 40% urgently required. State price and quantity. GEORGE RICE LIMITED, Warton Road, Stratford, E.15. Telephone—Maryland 1222.

WANTED, Betanaphtol, Sodium Nitrite, Sodium Sulphide, Caustic Soda, Soda Ash, any quantity, single drums to many tons. Please offer with fullest details, quality, percentage, and packing to Box No. 2559, THE CHEMICAL AGE, 154, Fleet Street, London E.C.4.

WANTED.—Supplies of Nitre Cake in ten-ton lots, Box No. 2126, THE CHEMICAL AGE, 154, Fleet Street, London, E.C.4.

20-40 gallon capacity emulsifier required. State type and price to Box No. 2560, THE CHEMICAL AGE, 154, Fleet Street, London, E.C.4.

MISCELLANEOUS

GORDON LAYCOCK & PARTNERS LTD. retain the services of a panel of 25 Consulting Engineers, and are willing to be associated with other independent consultants who require additional technical services and design facilities in order to undertake large industrial and civil engineering works at home and abroad. Engineers who may be interested in this offer are invited to write to the COMPANY at Glebe House, Leeds, 6.

WORKING NOTICE

THE Proprietor of British Patent No. 401,484 is prepared to license British manufacturers to work thereunder. It relates to the fractional distillation of volatile liquids and to processes for contacting immiscible fluids of different densities. Address: BOULT, WADE & TENNANT, 112, Hatton Garden, London, E.C.1.

AUCTIONEERS, VALUERS, Etc.

EDWARD RUSHTON, SON AND KENYON (Established 1855).

Auctioneers' Valuers and Fire Loss Assessors of CHEMICAL WORKS, PLANT AND MACHINERY

York House, 12 York Street, Manchester.

Telephone 1937 (2 lines) Central, Manchester.

Printed in Great Britain by THE PRESS AT COOMBELANDS, LTD., Addlestone, and published by BENN BROTHERS LTD., at Bouverie House, 154, Fleet Street, E.C.4, 29 November 1947. Registered at the General Post Office. Entered as Second Class Matter at the New York, U.S.A., Post Office.